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AIR POLLUTION ABSTRACTS

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This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 44694 - 45371.

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Personal authors are arranged alphabetically. The names are presented last name first. When the author is a primary author, an asterisk precedes the Abstract Number.

INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Semiannual cumulative indexes to both subject and author are also sent to all recipients of this monthly publication.

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Acknowledgement is given to the Technical Publications Branch, Informational Services Division, Office of Administration, Research Triangle Park, N.C. for the make-up of the cover and for arrangement of printing and distribution.

Feedback from our users, including suggestions of articles, are always welcome.

APTIC Publications

Air Pollution Aspects of Emission Sources: Primary Lead Production - A Bibliography with Abstracts, June 1973, GPO No. EP 4.9:126, $0.65.

Air pollution Aspects of Emission Sources: Primary Copper Production - A Bibliography with Abstracts, June 1973 GPO No. EP 4.9:125, $0.70.

Air Pollution Aspects of Emission Sources: Pulp and Paper Industry - A Bibliography with Abstracts, March 1973, GPO No. EP 4.9:121, $2.35.

Air Pollution Aspects of Emission Sources: Primary Aluminum Production - A Bibliography with Abstracts, June 1973, GPO No. EP 4.9:119, $0.90.

Mercury and Air Pollution: A Bibliography with Abstracts, October 1972, GPO No. EP 4.9:114, $1.25.

Odors and Air Pollution: A Bibliography with Abstracts, October 1972, GPO No. EP 4.9:113, $3.00.

Air Pollution Aspects of Emission Sources: Petroleum Refineries - A Bibliography With Abstracts, July 1972, GPO No. EP 4.9:110, $1.25.

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Air Pollution Aspects of Emission Sources: Boilers - A Bibliography With Abstracts, May 1972, GPO No. EP 4.9:105, $2.00.

Hydrochloric Acid and Air Pollution: An Annotated Bibliography, July 1971, GPO No. EP 4.9:100, $0.55.

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Air Pollution Aspects of Emission Sources: Cement Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:95, $0.50.

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Air Pollution Aspects of Emission Sources: Nitric Acid Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:93, $0.45.

Air Pollution Aspects of Emission Sources: Municipal Incineration - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:92, $1.00.

Photochemical Oxidants and Air Pollution: An Annotated Bibliography (2 Volumes), March 1971, GPO No. EP 4.9:88, $6.25.

Beryllium and Air Pollution: An Annotated Bibliography, February 1971, GPO No. EP 4.9:83, $0.40.

Asbestos and Air Pollution: An Annotated Bibliography, February 1971, GPO No. EP 4.9:82, $0.50.

Municipal Incineration: A Review of Literature, June 1971, GPO No. EP 4.9:79, $1.00.

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Contract No. 68-02-1095, Modification No. 4 .... *$53,804*
TECHNICAL ANALYSES OF AIR QUALITY DATA AND EMISSIONS DATA.
Computer Sciences Corporation, Systems Division, 8728 Colesville Road, Silver Spring, Maryland 20910 (NOTE: Contract contains options in the amount of $197,914)

Contract No. 68-02-1948, RFP No. Du-75-C081 .... *$48,383*
UPDATE, DEVELOPMENT AND ANALYSIS OF POWER PLANT DATA.
Board of Supervisors of Louisiana State University and Agricultural and Mechanical College Acting in Behalf of Louisiana State University - Baton Rouge, Baton Rouge, Louisiana 70803

Contract No. 68-02-1383, Task Order No. 10 .... *$50,000*
DEVELOP PLANS FOR A VEHICLE EMISSIONS INSPECTION/ MAINTENANCE PROGRAM FOR THE STATE OF TEXAS.
Radian Corporation, 8500 Shoal Creek Boulevard, Austin, Texas 78766

Contract No. 68-02-1378, Task Order No. 12 .... *$50,000*
COMPLIANCE STATUS DETERMINATIONS/ENFORCEMENT ACTION ASSISTANCE TO REGION IV FOR SOURCES IN THE STATE OF LOUISIANA.
Pacific Environmental Services, Inc., 1930 14th Street, Santa Monica, California 90404

Contract No. 68-02-1380, Task Order No. 9 .... *$40,000*
EVALUATION SIP PROGRESS IN 19 SELECTED AREAS IN WASHINGTON, OREGON, IDAHO AND ALASKA.
Engineering Science, Inc., 7903 Westpark Drive, McLean, Virginia 22101

Contract No. 68-02-0293, Modification No. 5 .... *$177,621*
DEMETALLIZATION OF RESIDUAL OILS.
Hydrocarbon Research, Inc., New York and Puritan Avenues, Trenton, New Jersey 08638

Contract No. 68-02-1377, Task Order 4 .... *$30,000*
EVALUATE AIR QUALITY IMPACT OF SELECTED INDUSTRIAL SOURCES.
Walden Research, A Division of Abcor, Inc., 201 Vassar Street, Cambridge, Massachusetts 02139

Contract No. 68-02-1863, RFP No. Du-75-X066 .... *$675,400*
SYSTEMS EVALUATION OF THE USE OF LOW SULFUR WESTERN COAL IN AN EXISTING SMALL AND INTERMEDIATE SIZE BOILERS.
KVB, Incorporated, 17332 Irvine Boulevard, Tustin, California 92680

Contract No. 68-02-0629, Modification No. 6.. *$98,400*
TECHNICAL SUPPORT IN FUEL CONVERSION.
Exxon Research and Engineering Company, P. O. Box 8, Linden, New Jersey 07036

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

1974

44694 **APTIC NO. 65278**

Bush, A. F. and R. R. Carlson

ELECTRON MICROSCOPE STUDIES OF THE EFFECT OF PREHEATER BYPASS ON SUBMICRON PARTICULATE EMISSIONS FROM AN OIL FIRED BOILER. *California Univ., Los Angeles, School of Engineering and Applied Science, UCLA-ENG-7452, 67p., June 1974.*

The effect of preheater bypass on submicron particulate emissions was studied at a steam plant. Samples were taken with a thermal precipitator and analyzed using an electron microscope. Particle counts and size distributions were made for three load conditions with and without preheater bypass. Preheater bypassing resulted in lower particle counts and larger mean particle sizes than with the normal preheater. At the lowest load condition (70 MW), the Formvar substrate of the microscope grids was attacked and eaten away by acidic droplets using the normal preheater. This indicated that acid formation occurred only during this load condition. Therefore, acid aerosol formation in the stack might be reduced by operating the preheater bypass during low load or low stack temperature conditions. Preheater bypassing was effective in raising stack gas temperature. Particle deposition and agglomeration occurring on the preheater and duct surfaces during low load operation can be reintrained during high load operation. Preheater bypassing at high load tends to increase reintrainment of deposited particulates. (Author summary modified)

44695 **APTIC NO. 65374**

Cross, Frank L., Jr., Henry C. Wohlers, and Glenn E. Benson

AIR POLLUTION AND THE ENVIRONMENTAL IMPACT ASSESSMENT. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 19p., 1974. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-205.)*

A procedure to estimate the air quality impact from air pollution sources and to assess this impact in relation to its effect on various types of receptors was determined. The impact of the emissions from a proposed plant may be predicted by a mathematical diffusion model. Inputs to the model are an inventory of emission sources, meteorological data, and a map of the impact area showing the location of emission sources and receptor points. The predicted contributions of pollutants may be plotted on maps as lines of equal concentrations called isopleths which provide a basis for judgment of the impact of these pollutants on the surrounding area. Two case studies are presented in detail. The first example evaluates the impact of constructing a 100,000 bbl/day grass roots refinery outside of a metropolitan area. The second sample examines the emissions (particulates and sulfur dioxide) from a power station meeting the national new source performance standards. (Author abstract modified)

44696 **APTIC NO. 65589**

Duncan, Linda J. and Edwin L. Keitz

HAZARDOUS PARTICULATE POLLUTION FROM TYPICAL OPERATIONS IN THE PRIMARY NON-FERROUS SMELTING INDUSTRY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1974. 30 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-274.)*

Hazardous pollutant sources, characteristics of those sources, and available control technology are discussed. Selected characteristics of the emissions from copper and zinc ore roasters and lead sintering machines are investigated. Typical size profiles for emissions from these processes and how these size profiles change after passing through typical control devices are shown. In all cases, fine particulates are a major fraction of the effluent and constitute an even larger fraction of the total after typical controls. Control of fine particulates from these processes could be improved by new or advanced technology in fabric filters especially for high temperatures and corrosive gas streams. Further study is needed to establish the feasibility of developing specific scrubbers for selected hazardous chemicals.

44697 **APTIC NO. 65592**

Franz, J. J., T. S. Govindan, and B. F. Gregorovich

A LABORATORY TECHNIQUE FOR ESTIMATING OFF-PLANT ODOR INTENSITY FROM SURFACE COATING PROCESSES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1974. 5 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-278.)*

A laboratory technique employed to estimate off-plant odor intensity from surface coating processes is described. A laboratory-scale set-up was designed to simulate odor emissions from drying and baking operations. These emissions were collected and then analyzed by a dynamic odor measurement technique. Predicting odors from selected organic coatings is studied and information is provided on process conditions favoring low odor emissions, process zones of maximum odor emission, and differences in odor intensity and pervasiveness among selected organic coatings. The experimental data were used to predict off-plant odors from coatings by dispersion modeling.

44698 **APTIC NO. 64967**

Fujimoto, Tatsuo

ANIMAL CADAVER TREATMENT MEASURES IN STOCK INDUSTRIES. *(Chikusan ryoiki ni okeru heiju shori taisaku). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 3(15):31-38, June 1974.*

The mortality of livestock from various diseases has been considerable in Japan. There are 4678 animal cadaver treatment plants where dead animals are treated according to regulations. However, there is no law regulating the disposal of dead chickens. It is not clear how most of the animal cadavers are treated since there is no data available. An investigation in Dec. 1973 on offensive odor pollution showed that 26.5% of the total pollution incidents resulted from livestock breeders and 16.4% from animal cadaver treatment plants. Plants which use animal skin, bone, and organs as materials are subjected

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to control of odor from waste water which they discharge. The regulations, issued on June 24, 1971, listed the facilities for raw material treatment, washing, pressing, vacuum concentration, and deodorizing as special facilities requiring regular inspection. Closed systems are substituted for open-type processes which give odors from various places. Odors from a closed system can be collected and treated. Closed system rendering plants are gradually replacing batch type plants in recent years.

44699 **APTIC NO. 68125**

Gersdorff, B. von and W. Sommer

POWER PLANTS AND INFLUENCE ON THE ENVIRONMENT IN URBAN CENTERS. *(Kraftwerke und Umweltbeeinflussung in Ballungsgebieten). Text in German. Brennstoff-Waerme-Kraft, 26(9):393-397, 1974. 2 refs.*

The geographical inhomogeneous distribution of the steadily rising power demand has led locally to remarkable influences on the environment. In the long run regional and even global influences on the climate cannot be ruled out. In urban centers particularly domestic heating contributes greatly to air pollution. A reduction can be achieved through better use of the primary energies and through substitution of the highly polluting energy carriers. The switch to remote supplies of energy is a recommendable goal. Favorable conditions prevail in urban areas for remote heating supply and for the combined generation of power and heat. Economic limits on combined power and heat generation are set by the different demand for power and heat at different times. Replacement of local heating by remove heating from fossil fuel-fired combined power and heating plants may cut the sulfur dioxide emission in half. Combined power and heat production contributes to the thermal pollution of the environment. The development trend here will move away from fresh water cooling to circulation cooling with wet cooling towers and eventually with dry cooling towers and Nuclear energy will increasingly replace conventional power plants in urban areas. Combined power and heat production is also feasible in nuclear power plants.

44700 **APTIC NO. 65232**

Groth, Richard H. and David J. Robertson

REACTIVE AND UNREACTIVE HYDROCARBON EMISSIONS FROM GAS TURBINE ENGINES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 19p., 1974. 8 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-89.)*

Engine emissions are analyzed by two techniques as a function of engine type, engine thrust (power), and fuel type. One technique is a high temperature subtractive analyzer (APCA 22,696 (1972)) which separates hydrocarbon emissions into paraffins, aromatics, olefins, and oxygenates. The liquid chromatographic technique separates the hydrocarbons into aliphatics, aromatics, and oxygenates. Specific engines tested were JT4, JT3D, and JT9D. Fuels studied were JP5 and Jet A fuel. Power settings ranged from sub idle to high power. Results using the high temperature subtractive analyzer indicate that the % unreactive hydrocarbons ranges from 30% at idle to near zero at high power for these engine types and fuels. In general, the higher the total hydrocarbon level, the higher the % unreactive hydrocarbons. (Total hydrocarbons decrease sharply with increase in thrust). The emissions from different types of engines at various power settings were collected on an adsorbent Chromosorb 102 and the adsorbate analyzed by liquid chromatographic techniques at A. D. Little, Inc. These results showed similar trends from low power to high power. The oxygenate fraction increased and aliphatic portions decreased. The data for this portion of the work was limited and no firm conclusions can be drawn. (Author abstract modified)

44701 **APTIC NO. 65729**

Heine, Arnd and Hans-Guenter Weidlich

THE INFLUENCES ON THE ENVIRONMENT BY COOLING SYSTEMS OF THERMAL POWER PLANTS UNDER THE CONDITIONS OF THE GERMAN DEMOCRATIC REPUBLIC. *(Die Umweltbeeinflussung durch Kuehlsysteme von Waermekraftwerken unter den Bedingungen der DDR). Text in German. Energietechnik, 24(7):293-297, 1974. 13 refs.*

The environmental effects of fresh water cooling and of wet cooling towers are discussed. With wet cooling towers the evaporated water quantities and spraying losses may affect the local meteorological conditions and cause formation of fog near the ground and icy roads. The water droplets of the steam plume may have radii between 0.002 to 0.03 cm and a falling speed of 8 cm/sec. The droplets of the spraying loss are larger by a factor of ten than the plume droplets and thus a considerably larger quantity reaches the ground. Experimental studies in the vicinity of four cooling towers each with a discharge of 28,000 cu m/hr and a construction height of 113 m yielded a precipitation maximum in dependence of the wind velocity at a distance of 200 to 450 m. This precipitation maximum reached between 0.005 and 0.01 mm/hr, depending on the ambient humidity. Larger precipitations (between 0.005 and 0.01 mm/hr) were still measured at 2 km distance. Agriculture and forestry is affected through early frosts in fall and late frosts in spring. The salt content emitted with the spray mist may fall to the ground in dissolved form or as aerosol after evaporation of the water. A chloride pollution by the spray water of 3.5 g/sq m/day could be determined. Field examinations yielded a sodium chloride/potassium chloride deposition on forest trees of 15 g/sq m/30 days which caused heavy damage and it is feared that all vegetation in the neighborhood of the cooling towers will die over the period of a decade.

44702 **APTIC NO. 65726**

Himi, Y.

PRESENT STATUS OF AIR POLLUTION IN TOKYO-YOKOHAMA INDUSTRIAL AREA. *(Keihin kogyo chitai no taiki osen no genjo). Text in Japanese. Kuki Seijo (Celan Air. - J. Japan. Air Cleaning Assoc., Tokyo), 11(7):1-13, Jan. 1974. 14 refs.*

Dust levels in the Tokyo-Yokohama industrial area have decreased due to the switch to heavy oil and heavier use of dust collecting facilities. Major components of dust in the area are silicon dioxide and sulfate ions. In an industrial area, there is more iron, manganese, calcium, titanium, chromium, and sulfate ions, and nickel and vanadium increase in non-industrial areas in winter. Lead is evenly distributed. Measurements of aerosols from July 28, 1971 to August 10 by high volume air samplers indicated more concentration in industrial areas, and showed less concentration farther away. Concentrations of sulfur dioxide and iron in aerosols in this area are very high, and aerosols increasingly contain sulfuric acid mist as more heavy oil came into use. About 100,000 tons of sulfur is discharged in the form of sulfur dioxide. The concentration of sulfur dioxide is also high in industrial areas. Warnings at times of high SO2 concentrations are issued. Efforts are being made to clarify the generation mechanism of photochemical smog with irradiation chambers. Although there has been an improvement in dust and SO2 control in the area, there are many sources of air pollution such as thermal power plants, integrated steel plants, and oil refineries, which still consume more than 7,400,000 kl of heavy oil/yr. Automotive emissions are a problem. With low sulfur fuel consumption, nitrogen oxides discharges may be decreased, but firing methods must be improved. Dust collecting and desulfurization equipment require energy and secondary pollution must be avoided.

44703 **APTIC NO. 68098**

Hiroyasu, Hiroyuki and Toshikazu Kadota

COMPUTER SIMULATION FOR COMBUSTION AND EXHAUST EMISSIONS IN SPARK IGNITION EN-

GINES. Combustion Inst., Pittsburgh, Pa., Proc. Int. Symp. Combust., 15th, Tokyo, Japan, 1974, p. 234-236. (Aug. 25-31.)

A two-part flame propagation and emission formulation model for computer simulation of spark ignition engine combustion and exhaust emissions, particularly nitric oxide formation, is described. The model predicts the complete dependence of NO concentration upon such parameters as engine speed, mixture ratio, spark advance, compression ratio, piston displacement, mixture movement, and chamber geometry. The NO concentration can be evaluated without any empirical data for the pressure history of the cylinder. Using the various values obtained with the flame propagation model, the concentrations of chemical species are calculated in individual packages of gas that burn during successive increments of time, assuming partial equilibrium. The formation of NO is assumed to be a nonequilibrium process controlled by chemical kinetics and occurring only in the post-flame. Pressure and temperature in the cylinder, burned mass fraction, and concentrations of NO and other species are calculated for various chamber geometries, equivalence ratios, degrees of turbulence, and other parameters of the design and operation of the engine using digital computer.

44704 APTIC NO. 69068

Kimura, Motoo

LEAD-FREE VEHICLE GASOLINE. *(Jidosha gasorin no muenka). Text in Japanese. Kagaku Kogaku (Chem. Eng.), 38(8):556-560, Aug. 1974. 11 refs.*

The findings of a committee studying vehicle fuel, established in an effort to make clear the problem of exhaust valve seat recession, are summarized. If lead-free gasoline is used, exhaust valve seat recession occurs in automobiles moving at a speed of more than 80 km/hr or even in trucks running in urban areas. Lead of 0.2 to 0.5 ml/gal helps, however, to prevent the occurrence of exhaust valve seat recession. The amount of exhaust hydrocarbons increases when valve sheet recession occurs. Though phosphorus compounds prevent valve seat recession from occurring, phosphorus compounds may contribute to air pollution.

44705 APTIC NO. 65655

Kutzschbauch, K.

INCINERATION. *(Muellverbrennung). Text in German. Technik. (Berlin), 29(8):530-534, Aug. 1974. 4 refs.*

In the German Democratic Republic the mountain of trash is increasing. The prevailing disposal method is dumping and it will remain so in the future but composting and incineration will gain increasing importance. Development of incinerators on a large scale began after 1950. Presently about 170 incinerators are in operation the world over. In several European cities incinerators are under construction or their construction is planned. Moscow inaugurated a combined incinerator/composting plant in 1972 with an annual throughput of about 500,000 cu m trash. In Western Europe roughly 20% of trash is incinerated with waste heat utilization. A review of the incinerating process is given. Incinerators can be economically operated only from a certain capacity on and thus are suitable only for urban areas. Examinations of the flue gases showed that per 1 kg trash 5 cu m of waste gas is produced. The present polyvinyl chloride (PVC) content in trash does not yield hydrogen chloride concentrations in the waste gas in excess of the admissible limits. At present there is still an eight- to tenfold safety margin. The measured fluorine concentration amounts to 1/5 of the limit value. Phosgene was not detectable in waste gases from incinerators even with additional amounts of PVC added to the trash.

44706 APTIC NO. 65698

Kyriakopoulos, G. B.

THE CARBON MONOXIDE AS AN EXHAUST EMISSION CONSTITUENT FROM THE FOUR-STROKE GASOLINE ENGINE. *(To monoxeidion tou anthrakos eis ta kausaeria ton tetrachronon kinetnron ton autokineton). Text in Greek. Tech. Chron. (Athens) 1(571):59-69, Jan. 1974. 25 refs.*

The subject of carbon monoxide emitted from the exhaust pipe of four-stroke gasoline car engines is discussed. An analysis is made of all technological factors which influence its formation in the exhaust gases; on the one side are those which are related with the automobile industry, and on the other side are those which are related to the fuel and lubricating oil, that is, those related with the petroleum industry. The health and legal aspects of the subject are also mentioned. Tests were made on cars to study those factors which influence the CO in the exhaust during the use and maintenance of a car. The most important factor is the maintenance of a car. The factor which is the cause of a significantly high percentage of CO in the exhaust gases is the improper adjustment of the carburetor when the correct air/fuel ratio is determined in the service workshop. The correct adjustment is ensured by the use of exhaust gas analyzers. The contribution of the driver to confining atmospheric pollution is stressed, especially in those parts of town which, due to traffic congestion, suffer intensively from the pollution.

44707 APTIC NO. 65475

Lipfert, F. W.

IMPACT OF ALTERNATE FUELS ON STATIONARY GAS TURBINE OPERATIONS AND SITING. *Preprint, American Society of Mechanical Engineers, New York, 10p., 1974. 11 refs. (Presented at the American Society of Mechanical Engineers, Gas Turbine Conference and Products Show, Zurich, Switzerland, March 30-April 4, 1974, Paper 74-GT-154.)*

An analysis of gas turbine ambient air quality impact is presented from the standpoint of the acceptability of alternate fuels having higher sulfur content and possibly higher particulate emissions. Various plume rise formulas are compared, and formulas are given for maximum ground level concentrations for both short term (1-3 hr) and intermediate (3-24 hr) periods. The results show that the U. S. Federal Air Quality Standards may allow large gas turbine complexes (approximately 500 mw) burning up to 1% sulfur fuel, for example. Larger gas turbine units have a strong advantage in meeting air quality standards due to the dependence of plume rise on heat emission rate. Larger units have thermal reinforcement of plumes, giving a higher plume temperature, and thus a greater plume rise and dispersion. Taking advantage of this capability could increase the supply of lower sulfur fuels for home heating and/or transportation use.

44708 APTIC NO. 65727

Liska, Mieczyslaw

ABATEMENT OF THE CORROSIVENESS OF THE ATMOSPHERE BY THE DESULFURIZATION OF COAL USED IN POWER PLANTS. *(Obnizenie korozyjnej agresywnosci atmosfery przez odsiarkowanie wegli energetycznych). Text in Polish. Ochr. Koroz., 17(3):65-68, March 1974.*

The problem posed to industries producing sulfuric acid, copper metallurgy, and power plants by utilization of coal with a high sulfur content is presented, and abatement of corrosion by coal desulfurization is discussed. Sulfuric acid plants utilize simple and efficient control devices and emit minimum pollutants. Poland exports installations characterized by a sulfur dioxide and sulfur trioxide conversion level of minimum 99.8%, a sulfur trioxide absorption level of minimum 99.9%, and a sulfuric acid fog content not exceeding 0.1 g/N cu m. Power plants are the main sulfur pollutant sources in Poland. The biggest problem is in the Ojcow region, where forests are threatened by sulfur dioxide pollution and upper Silesia, where buildings have to be painted every 1 1/2 or 2 yr instead of 5 yr. The cost of anticorrosive protective measures by painting reach about $333,333,333/yr. In the southern mining region, the Jaworzno Mikolow, Siersza, Janina, Komuna Paryska, and Sobieski mines supply power plants with coal with a 2.7 to 4.6% combustible sulfur. A pyrite plant could be built to produce a pyrite concentrate and a sulfuric acid plant can utilize the by-product pyrite. The cost of sulfuric acid is about $35/ton, while the price for pyrite is up to $14/ton, depending on its quality. The sulfuric acid industry would be able to supply foundries with calcinated pyrite, which costs $15/ton, thus reducing its acid production costs. Coal pyrites can be supplied to copper foundries as well. Various costs for U. S. and Polish coal desulfurization methods are discussed.

44709 **APTIC NO. 65748**

Litaudon, Jean and Jean-Marie Fiquet

SOLUTION TO THE PROBLEM CREATED BY RESIDUAL OIL FIRING IN STEAM GENERATORS WITH MIXED FIRING AT THE LE HAVRE THERMAL POWER PLANT. *(Resolution des problemes poses par la marche au mazout de generateurs de vapeur a combustion mixte a la centrale thermique du Havre). Text in French. Rev. Gen. Thermique (Paris), 13(146):131-152, Feb. 1974.*

The utilization of foreign fuel oil in steam generators with mixed firing at the le Havre thermal power plant is discussed. The Havre plant consists of two blocks with a power of respectively 250 MW and 600 MW. The turboalternators are supplied with steam with debits of respectively 735 tons/hr and 1810 tons/hr. The problem created by the residual oil firing in the steam generators resulted in a significant emission of incompletely burned solids and sulfur trioxide. One of the solutions found is to preheat the air below 50 C at the entrance to the air heaters. A temperature of 80 C tends to eliminate acid corrosion and allows the increase of excess air. Injecting of ammonia into the combustion gas eliminates acid corrosion of sheaths, dust deposits, aids the collection of ammonium sulfate, and systematically controls the sulfur trioxide content in the combustion gases.

44710 **APTIC NO. 65058**

MacWaters, John T. and Douglas J. Pelton

COMPILATION OF INDIRECT SOURCE MONITORING STUDIES. (FINAL REPORT). *Geomet, Inc., Rockville, Md., Office of Air and Waste Management Contract 68-02-1094, Task Order 5, Program Element 2AC129-53, Rept. EPA-450/3-74-043, Geomet Rept. EF-316, 86p., April 1974. 64 refs.*

NTIS: PB 234009/AS

Abstracts are presented of air quality monitoring studies conducted in the vicinity of indirect sources. Types of indirect sources include airports, amusement parks, highways, parking lots, shopping centers, recreational areas, sports complexes, commercial and residential developments, and parking garages. The data is presented to provide potential sources of information to agencies or developers having to make an analysis of the impact of a proposed indirect source on air quality.

44711 **APTIC NO. 68083**

Newman, Peter

ENVIRONMENTAL IMPACT: PART 1 - DEVELOPMENT OF A SEMI- QUANTITATIVE PARAMETER AND ITS IMPLICATIONS. *J. Environ. Syst., 4(2):97-108, Summer 1974. 29 refs.*

A model which reduces the multiple causes of damage to the environment by human activities into one easily calculated semi-quantitative parameter is presented. The formulation is achieved by understanding an ecosystem disturbance in terms of its energy and material flows and superimposing on it the activities of man due to imported or exotic energy (food and fuel). Environmental impact is defined as exotic energy use divided by the environmental area which is in turn developed to show that environmental impact is also equal to exotic energy divided by the population times the population divided by the area of the environment. Thus the interrelated components of environmental damage are exotic energy use percapita and population density. The model implies that much pollution technology and alternate energy production is energy intensive, resulting in an increase rather than decrease in the total effect on the environment. Air pollution stack gas cleaning devices and automobile emission controls are cited as examples of energy intensive techniques which could increase the overall environmental impact.

44712 **APTIC NO. 64968**

Nishida, Konosuke, Takashi Suzuka, Tsuneo Honda,
Masanobu Yamakawa, and Kazuhiko Mitsuoka

STUDIES ON THE COMPREHENSIVE EVALUATION OF ENVIRONMENTAL POLLUTION, I: CASES IN OSAKA PREFECTURE. *(Kankyo osen no sogo hyoka ni kansuru kenkyu (I), Osaka fuka ni okeru jitsurei kara). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 10(7):21-38, July 1974.*

Total oil consumption in Osaka prefecture has increased significantly whereas coal consumption remains almost unchanged. Approximately 50% of the oil was consumed in the Sakaichi industrial area. The large consumption of oil generated the problem of air pollution by sulfur dioxide. Emissions from large refineries and power plants were reduced by high stacks and the use of low sulfur oil; thus, despite the increase of oil consumption, the total emission has remained almost constant. Areas behind Sakaichi showed an increasing SO2 concentration during the past years due to the west winds from sea. Generally it is considered as a stable pollution in the entire area without sudden increase or decrease. However, the situation may change due to the high emission in Sakaichi. More than 97% of carbon monoxide and hydrocarbon and about 37% of nitrogen oxides were from automotive exhaust. The CO concentration can be estimated from total traffic amounts by a simple calculation using specific constants. Airborne particulates have an additive effect with SO2 and are one of the most important pollutants. The particulate concentration in Osaka area have decreased in the past 3 yr, possibly due to the change of measuring methods from high volume sampler to digital dust meter.

44713 **APTIC NO. 68128**

Schneider, H. K., H. J. Schuermann and W. Moenig

THE REQUIREMENTS OF THE SOCIAL AND NATURAL ENVIRONMENT ON PLANNING AND DEVELOPMENT OF THE POWER ECONOMY IN THE FEDERAL REPUBLIC OF GERMANY. *(Die Anforderungen der sozialen und batuerlichen Umwelt an die Planung und Entwicklung der Elektrizitaetswirtschaft in der Bundesrepublik Deutschland). Text in German. Brennstoff-Waerme-Kraft, 26(9):374-379, Sept. 1974. 12 refs.*

The power consumption in the Federal Republic of Germany will rise from a total of 266.2 billion kWh in 1971 to 680 billion kWh in 1985. This forcast has been based on a revised insight into the development of future power consumption in the Federal Republic of Germany. A lower growth of the annual gross national product (4% instead of 4.5%) because of the slower population growth has been assumed. No long-term effects of the energy crisis in the form of a reduction of the oil supply has been included. The flexibility of the total power consumption with regard to the gross national income has been slightly reduced from a factor of 1 to a factor of 0.9. The growth rate of the primary energy consumption has been reduced from 4.5% to 3.6% per annum. Due to the rising oil prices a higher substitution rate for electri power has been used (25% instead of the old 23%). The environmental pollution resulting from the higher energy consumption in 1985 has been analyzed and it was found that the total sulfur dioxide emission of 3.2 million tons in 1971 will have risen to 3.7 million tons by 1985, the total oxides of nitrogen emission from 1.9 to 2.6 million tons, the hydrocarbon emission from 0.5 to 0.6 million tons, and the carbon monoxide emission will be up from 6.5 to 8.5 million tons. For power plants particularly the increases of the SO2 and NOx emissions weigh heavily. A pollution tax introduced for power plants now would have the positive effect of speeding up development of flue gas desulfurization methods and the introduction of low-sulfur fuels.

44714 **APTIC NO. 65487**

Simensen, Terje

STUDIES BEING CONDUCTED IN DENMARK, FINLAND, NORWAY AND SWEDEN ON SEWAGE SLUDGE FROM MUNICIPAL WASTE WATER TREATMENT PLANTS. *(Pagaende forskning i Danmark, Finland, Norge og Sverige vedrorende slam fra kommunale renseanlegg). Text in Danish. In: Hygieniske Problemer Vedrorende Deponering Og Jordbruksanvendelse Av Kommunalt Kloakkslam (I). Nordforsk Miljovardssekretariatet, Arbetsgrupp for Slamfragor, Rept. 2, p. 29-46, 1974.*

Studies and research activities being pursued by different institutions in Finland, Denmark, Sweden, and Norway concerning the properties, processing, disposal, use, and destruction of sewage sludge from municipal waste water treatment plants are listed. Problems of odor control during the mechanical treatment of sewage sludge, the incineration and pyrolysis of sewage sludge, the reactions of phosphorus present in sludge during incineration, and the overall heavy metal fallout over Denmark are among the projects currently studied.

44715 **APTIC NO. 65267**

Thron, Raymond W.

A REGIONAL HIGHWAY NETWORK AS A COMPLEX SOURCE OF REGIONAL MAGNITUDE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 28p., 1974. 22 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-144.)*

The application of a vehicular emissions inventory and future vehicular emission forecasts as an integral part of long range air quality maintenance and as input data for the evaluation of complex sources is discussed. Carbon monoxide, hydrocarbons, and nitrogen oxides emissions were computed as attributable to automobiles and gasoline and diesel powered trucks, as based on assigned network traffic volumes and speed by vehicle type. Emissions were calculated for the years 1980, 1990, and 2000 and were compared to the emissions inventory for 1970. A physical development modeling procedure distributed resident and non-resident generated persontrips onto the regional roadway network as planned for 1980, 1990, and 2000. With a regional vehicle miles traveled that increases from 21.7 million in 1970 to nearly 48 million in 2000, the total emissons of NOx and hydrocarbons are within the allowable regional emissions level as calculated for 2000. (Author abstract modified)

44716 **APTIC NO. 65505**

Torian, Richard L.

WASTE DISPOSAL OF PLASTICS--A REVIEW OF WORK IN FOREIGN COUNTRIES. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th, Cost. Eff. Environ. Sci. Washington, D. C., 1974, p. 336-339. 21 refs. (April 28-May 1.)*

Many countries are studying the disposal of plastic wastes by biodegradation, photodegradation, and recyling. Some researchers are working on developing a biodegradable plastic either by modifying existing plastics or by developing new plastics. Other research is being done on developing selected mutants and microorganisms which better biodegrade existing plastics. Photodegradation uses ultraviolet radiation from the sun to break down the polymer chain. Photodegradation is time and temperature dependent and varies with plastic thickness, concentration, and additives. Recycling involves the recovery or reuse of plastic. Various methods are being studied for the conversion of plastic wastes into usable gases, building materials, new plastic products, and other materials.

44717 **APTIC NO. 65424**

Weast, T. E., L. J. Shannon, P. G. Gorman, and C. M. Guenther

FINE PARTICULATE EMISSION INVENTORY AND CONTROL SURVEY (FINAL REPORT). *Midwest Research Inst., Kansas City, Mo., Environmental Protection Agency Contract 68-02-1324, Proj, 3821-C-1, Task 1, Rept. EPA-450/3-74-040, 270p., Jan. 1974. 26 refs.*

NTIS: PB 234156/AS

An emissions inventory and control survey developed for the National Air Data Branch of the Environmental Protection Agency is presented for fine particulates. Attention is focused on estimates of primary particulates, with both stationary point and area sources being included in the emission inventory; the contribution of mobile sources to the primary fine particulate burden is also included. The report is divided into the following areas: an information search to determine the availability of data and other background information necessary to define particle emission; preparation of an inventory of estimated fine particulate emissions in the United States; compilation of information on the chemical and physical properties of fine particulate emissions; methodology development for performing a detailed emission inventory of fine particulates for the entire United States and for four cities in the U. S., an assessment and overview of the current status of emission inventories for fine particulates, and recommendations for future work.

44718 **APTIC NO. 68093**

Worster, Hans E.

THE PRESENT AND FUTURE OF ALKALINE PULPING. *Pulp Paper, Can., 75(10):45-50, Oct. 1974. 29 refs.*

The present status of alkaline pulping, with particular emphasis on the kraft process, is reviewed along with future prospects for modified processes which will result in reductions in pollution. The major reason for air pollution with reduced volatile sulfur compounds such as hydrogen sulfide, methyl mercaptan, dimethyl sulfide, and dimethyl disulfide emitted from present kraft processes is the sodium sulfide content of the kraft liquors. The present kraft processes also have high raw material requirements per ton of product as compared to sulfite processes, for example. Problems associated with odor abatement in kraft processes are leading to a reassessment of alkaline sulfite pulping and a variety of nonsulfur pulping methods, the most practical of the latter being two-stage soda-oxygen pulping. Its principle consists of soda pulping to a relatively high Kappa number, followed by difiberization and subsequent further delignification with alkali and oxygen under pressure to the desired final Kappa number. Other processes being considered are the polysulfide and the H2S-kraft process.

44719 **APTIC NO. 64969**

Yamaguchi, Ikuji

THE PROGRESS IN THE LAST TEN YEARS OF ANAN, THE NEW INDUSTRIAL CITY. *(Shinsan toshi Anan no 10-nen no ayumi). Text in Japanese. Kogai to taisaku (J. Pollution Control), 10(7):57-60, July 1974.*

Since Anan was designed as a new industrial city, residents have been fighting to reject construction of large refineries. Some plants were constructed in the past 10 yr. On the afternoon of May 29, 1969, a white wall of a gas station about 100 m away from a plant was suddenly turned yellow. At the same moment, residents in a Toshima bus station area, including some as far as 5 km from the station, had abnormal headaches, pains in the throat and nose, and dizziness. These effects were caused by extremely poisonous chromium(VI) emitted from Nippon Electrical Industrial Co. There were about 600 persons injured, plus damage to a large quantity of crops. Offensive odors from Kanazaki Paper Co. and Toa Gosei Co. have been a problem for many years and remain unsolved. Shikoku Electric Co. built two generators in 1963 and 1966, with two stacks, 80 m and 100 m, respectively to prevent pollution. Two more generators were built in 1971 and at residents requests, the company constructed 200 m stacks and used oil with a lower sulfur content (1.3% instead of 1.5% requested by the residents). The company also acquired high capacity desulfurization apparatus.

44720 **APTIC NO. 65369**

Office of Air and Water Programs, Research Triangle Park, N. C., Air Pollution Technical Information Center

AIR POLLUTION ASPECTS OF EMISSION SOURCES: FERROUS FOUNDRIES A BIBLIOGRAPHY WITH ASBSTRACTS. *Environmental Protection Agency Rept. 450/1-74-004, 42p., March 1974. 112 refs.*

NTIS: PB 232500/AS; GPO

An annotated bibliography of the air pollution aspects of emissions from ferrous foundries is presented. The 112 abstracts are arranged within these categories: emission sources, control methods, measurement methods, air quality measurements, atmospheric interaction, effects--human health, effects--economic, standards and criteria, legal and administrative, and general. Author and subject indices are provided.

44721 **APTIC NO. 65484**

Office of Air and Water Programs, Research Triangle Park, N. C., Air Pollution Technical Information Center

AIR POLLUTION ASPECTS OF EMISSION SOURCES: PRIMARY ZINC PRODUCTION A BIBLIOGRAPHY WITH ASBSTRACT. *Environmental Protection Agency Rept. 450/1-74-003, 35p., March 1974. 73 refs.*

NTIS: PB232499/AS;GPO

An annotated bibliography of the air pollution aspects of emissions from primary zinc production is presented. The 73 abstracts are arranged within these categories: emission sources, control methods, measurement methods, air quality measurements, atmospheric interaction, basic science and technology, effects-human health, effects--plants and livestock, effects--economic, standards and criteria, and legal and administrative. Author and subject indices are provided.

44722 **APTIC NO. 65619**

Kanagawa Prefectural Pollution Control Center (Japan) and Kanagawa Prefectural Assoc. for Pharmacists (Japan)

CYANIDE CONCENTRATIONS IN AUTOMOTIVE EXHAUST GASES, COMBUSTION GASES, AND IN THE LIVING ENVIRONMENT. *(Jidosha haishutsu gasu, nensho hai gasu oyobi seikatsu kankyochu no shian nodo). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 16:146-151, Feb. 1974. 3 refs.*

The cyanide concentrations in automotive emission gases, combustion gases, and the environmental atmosphere were measured by the ion electrode method described in the preceding report. The detection of 5 mg/cu m of CN in automotive emission has been reported, but in this study, 2.6 mg was found in idling exhausts, 6.5 mg/cu m when driving at 40 km/hr, 12 mg/cu m when driving at 60 km/hr, and 18 mg when driving at 80 km/hr. A catalytic converter was relatively effective for removal of cyanide with 50-90% results. Slow adjustment was also effective, and CN concentration was 13 mg/cu m when carbon monoxide was 9.5%, but was reduced to 2.6 mg when CO was 5.1%, and to 1.4 mg when CO was 1.5%. The CN concentration in incinerator flue gas was 5.6-9.5 mg/cu m when combustion was incomplete, and 0.3-1.3 mg when the combustion was complete. Incomplete combustion was caused by throwing in a large quantity of refuse at a time. For an ordinary boiler and heated air furnace flue, CN was not detected (less than 0.025 mg/cu m). At traffic intersections, CN was from nondetectable to 0.005 mg/cu m, and in the area of coke furnaces it was from indetectable to 0.009 mg. These concentrations were all far below the environmental standard for CN.

44723 **APTIC NO. 65620**

Kanagawa Prefectural Pollution Control Center (Japan)

INVESTIGATION OF FLUE GAS COMPONENTS AND THEIR EFFECTS - FLUE GAS COMPOSITIONS BY INDUSTRY CATEGORIES AND FACILITIES. *(Endo baijin no seibun sosei to eikyo chosa--gyoshu oyobi shisetsubetsu endo baijin no seibun sosei ni tsuite). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 16:156-164, Feb. 1974.*

As part of the investigation of toxic components in flue gas dusts, flue gas dust samples from 20 installations of six industries were given analyses for toxic components, soluble metals, and soluble minus ions. Depending on the industry and installation, the toxic components and their ratio were varied and complex; they also depended on the material and the fuel. In refuse incinerator dusts, lead was contained most, then iron, zinc, tin, and titanium. The solubility of cadmium was high and reached 500 ppm in some samples. Lead was also water soluble. In the incinerator dust, chloride ion, sulfate ion, and fluoride ion were relatively high, but pH was mostly neutral. Dusts in fuel boilers contained a large amount of vanadium and nickel compared to powder coal mixture combustion boilers, and the total sulfur and sulfuric ion counts were high. The dusts of the mixed combustion furnace was alkaline and there were no soluble metals, but oil furnace dusts were strongly acidic if the sulfur content in oil was high and solubility was high. In this case, a soot neutralization treatment was effective. The dust contents of glass melting furnaces were greatly varied. The lead content of the lead glass furnace was as high as 50%, but not in others. For all glass furnaces except the lead glass furnace, 40-50% of the dust was sulfate and water solubility was high. Depending on the material, some high concentrations of fluoride ion were found. Carbon electrode furnace dusts were strongly acidic, and the lead smelting furnace had 75% lead.

44724 **APTIC NO. 65621**

Kanagawa Prefectural Pollution Control Center (Japan)

INVESTIGATION OF DUSTS IN FLUE GASES AT MAIN DUST EMISSION FACILITIES. *(Shuyo baijin hassei shisetsu ni okeru endo hai gasu- chu no baijinryo no chosa kekka). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 16:152-155, Feb. 1974.*

Eighteen installations at eight main factories in Kanagawa Prefecture were investigated to determine the dust emission quantities and the efficiency of dust collection facilities. The tests were conducted in accordance with the Japanese Industrial Standard dust measurement method and performance test methods between Feb. and June 1973. Incinerators, frame material dryers, electric furnaces, and metal heating furnaces were included. In all installations, the dust emission concentration in flue gas was within the regulation standards, but the dust concentration in incinerator flue gases was higher than others. Other facilities with high concentration of dusts were steel electric furnaces and frame material dryers. In comparison, petroleum heating furnaces, forging furnaces, soaking pits, and annealing furnaces had extremely small dust concentrations. The dust collection rates of collectors ranged from 38 to 99.8%. The good efficiency collectors were the electrostatic precipitator (99.8%) at a glass melting furnace, the bag filter (99.3%) at a frame material dryer, and the bag filter at a steel electric furnace (97%). The scrubber at a detergent dryer (38%) and the multicyclone at an incinerator (50%) suggested some operation deficiency. Emission coefficients for 1 kl of fuel oil, 1 ton of treatment gas, or 10000 kwh of electricity are presented in tables.

44725 **APTIC NO. 65622**

Yokohama National Univ. (Japan), School of Engineering

STUDIES ON THE PREVENTION OF AIR POLLUTION BY CITY REFUSE INCINERATION--FORMATION OF TOXIC GASES BY COMBUSTION OF POLYVINYL CHLORIDE. *(Toshi gomi no shokyaku ni yoru taiki osen no boshi ni kansuru kenkyu--pori enka biniru no nensho ni yoru yugai gasu no hassei ni tsuite). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 16:136-141, Feb. 1974. 7 refs.*

Polyvinyl chloride (PVC) products and other natural polymer products were experimentally heated, and the combustion gases and their components were compared. The test device comprises a compresser, a dryer, a nitrogen pump and a needle valve, an air tank, a flow meter, an electric furnace with a combustion tube, a gas sampler, a voltage meter, an electric current meter, and a pyrometer. Newspaper, wood, wool, silk, rayon, polyester, melamin, and various PVC were heated at 300, 400, 500, 600, and 700 C with excess air, and the combustion gases were taken and analyzed immediately. The composition of chemicals depended on the shape, form, and the amounts of plastic and stabilizer additives. Hydrogen chloride and steam did not form at all in all cases up to about 200 C and began to appear at about 250 C. The maximum formation was reached at about 400. The maximum level of carbon monoxide gas was also reached at about 400 C. Among PVC, the wall leather and automobile seat leather had the greatest ratio of stabilizer additives. These materials did not produce more than 10% of the original content of hydrogen chloride up to 700 C. Both nitrogen dioxide and chlorine emissions were less than 0.1 ppm, and hydrogen sulfide and sulfur dioxide emissions were less than 0.5 ppm. When the air supply and oxygen quantity were changed, the total amount of HCl was not affected, but the total CO and carbon dioxide emissions increased with the amount of air.

44726 **APTIC NO. 65625**

Kanagawa Prefectural Pollution Control Bureau (Japan)

AIR POLLUTION CONTROL MEASURES: THE STATE OF MAIN REGULATION ENFORCEMENT BASED ON AIR POLLUTION CONTROL LAWS. *(Taiki osen boshi taisaku: taiki osen boshiho ni motozuku shuyo jiko shiko jokyo). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 16:113-117, Feb. 1974.*

The total number of soot emitting installations in Kanagawa Prefecture is 8080, including 3221 in Yokohama (39.9%), 1804 in Kawasaki (22.3%), 445 in Fujisawa, and 388 in Yokosuka. Of the total, 67.5% are boilers, 11.5% are metal heating furnaces, 5.3% are drying furnaces, and 3.8% are incinerators. Of these, 3216 factories and places of operation are subjected to the air pollutants emission control regulations. In addition, there are 500 dust emission sources such as belt conveyors, dust bins, crushers, grinders, and storage bins, and 113 places of operation are subjected to the control regulations. The 1972 fuel consumption in Yokohama was 3,369,740 kl of fuel oil with an average sulfur content of 0.75% and 1,563,176.9 tons of coal with average sulfur content of 0.30%. The consumption in Kawasaki was 3,803,620 kl of oil with 0.68% sulfur content and 390,000 tons of coal with 0.35% sulfur. The sulfur content in fuel oil has been decreasing steadily since 2.3% of 1967. In an emergency high sulfur oxide concentration, the total SOx emission in Yokohama is to be 2,767.3 N cu m/hr (close to one third of 1969), and in Kawasaki, 3,682 N cu m/hr (less than 1/2 of 1969). With the enforcement of Class I measures, the tota SOx emission of the Prefecture will be decreased by 28.9%, with that of Class II, a 54% decrease, and with that of Class III, a 61.7% decrease.

44727 **APTIC NO. 65627**

Kanagawa Prefectural Pollution Control Center (Japan)

MEASUREMENT OF BAD ODOR AND DISPERSION OF ODOR IN STOCKYARD AREAS. *(Chikusanjo shuhen ni okeru akushu no sokutei to kakusan). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 16:70-75, Feb. 1974. 1 ref.*

Nine stockyards and two fishmeal and animal offal treatment plants were investigated, and the composition of bad odor and odor dispersion conditions were studied. Ammonia was measured by indophenol, trimethylamine by gas chromatography, and hydrogen sulfide by methylene blue. The degree of odor was determined by the six-step odor intensity sensitivity test. Sample air was taken by a device with a tube of absorbent liquid and another tube packed with glasswool and activated carbon. Ammonia was detected at all 11 places of operation both in the work area and on the borderline of the grounds. Trimethylamine was detected (limit 0.001 ppm) only at three plants and only at a certain time. Hydrogen sulfide was detected (limit 0.01 ppm) only at three plants, always at one stockyard, and at the other two only at one or two occasions. The amount was 0.01 ppm on all occasions. The ammonia average of eight of the nine stockyards was 0.56 ppm, and at the border, 0.18 ppm, and the attenuation rate was about 70%. At some stockyards, the concentration decrease by dispersion could be expressed by an equation under given conditions.

44728 **APTIC NO. 65712**

WATER ECONOMY ANNUAL REPORT - RHINELAND PALATINATE. *(Wasserwirtschaft - Jahresbericht - Rheinland-Pfalz). Text in German. Wasser Boden, 26(6/7):202-207, 1974.*

The sludge purification and incineration plant of the city of Kaiserlautern is described. The purification plant serves a population of about 120,000 plus a population equivalent of 130,000 from commerce and industry. Construction began in 1949, and the biological stage was added in 1960. In 1968 two sludge digestion basisn with a volume of 8000 cu m and a sludge dewatering station with six decanting centrifuges were built. By adding flocculents the sludge volume is reduced to 1/5 of the original volume and the water content is reduced from 96% to 80%. In 1970 the sludge incinerator was added. The purification plants yields daily 430 cu m fresh sludge which goes to the sludge digestion station. After a residence time of 20 days the sludge is dewatered for which flocculents at a cost of 83 cent/cu m sludge are added. The dewatered sludge is continuously supplied to the incinerator with a capacity of 7.5 tons/hr. It is a story furnace with the eight upper stories for drying the sludge, one story for combustion, and two stories for ash cooling. In the combustion zone a temperature of 850 to 900 C prevails. The ash (8 cu m/day) is transported to containers and tipped. The flue gas stack has a height of 50 m. The flue gases are cleaned with water from the post-purification basin. The scrubbing water is then returned to the purification plant. Total expenditures for the incinerator amounted to $1.33 million. The biological sewage sludge digestion plant in Lambsheim/Palatinate, Federal Republic of Germany is also described. The essential part of the plant is a bio-reactor made of heat insulated steel on concrete foundation.

44729 **APTIC NO. 65717**

POLLUTION CONTROL MEASURES IN KITAKYUSHU CITY. *(Kitakyushu-shi no kogai taisaku). Text in Japanese. Kankyo Kenkyu (Environ. Studies), no. 5:79-87, Jan. 1974.*

Emission sources and current control programs in Kitakyushu are discussed. The major industries in the city are iron and steel manufacturing (43.2% of the total emissions) chemical processing (13.3%), food processing (11.1%), general machinery (7%), and ceramics production (6.7%). The liquid fuel consumption has increased to about 4.23 kl in 1972 which is twice as much as 1968. Heavy oil accounted for 92.2%. The highest annual average value, 0.045 ppm of sulfur oxides, was recorded at the Wakamatsu station in 1972 while the highest 1-hour value of 0.289 ppm was recorded at Tobata. The municipal administration is negotiating an anti-pollution agreement with the industrial enterprises recommending the use of low-sulfur fuel. This measure has proven successful and the SOx concentration has been decreasing each year since 1968. The field inspections of factories are conducted by city officials to investigate the SOx, smoke, and dust emissions. The target reduction of smoke and dust emission is currently set at 30%.

1973

44730 **APTIC NO. 65034**

Antonyuk, O. K.

COMPARATIVE HYGIENIC EVALUATION OF POLYVINYL CHLORIDE MATERIALS USED IN HOUSING CONSTRUCTION. *(Sravnitel naya gigiyenicheskaya otsenka polivinilkhloridnykh materialov, primenyayemykh v zhilishchnom stroitel stve). Gigiena i Sanit., 38(9):92-94, Sept. 1973. 5 refs. Translated from Russian, 5p.*

Sixteen samples of polymer materials based on polyvinyl chloride resins were divided into four groups based on the type of plasticizer used in its manufacture. The the samples were observed at conditions of their natural use, and the air composition in the area was measured after 1, 3, 6, and 9 mo. The air was analyzed for the presence of phthalates, brominating substances, and hydrogen chloride. Phthalates and brominating substances were given off by all substances in group one. Studies were also carried out in unoccupied residences and in occupied buildings at various periods after the latter had been opened to occupancy (3, 6, 9, and 12 mo). Air samples were collected in rooms that had not been ventilated for 24 hr, 1.5 m above the floor during the spring-summer period at 18 and 31 deg. Volatile compounds released from the polyvinyl chloride materials were observed in the air of almost all of the rooms. The highest concentrations of compounds were found 2-3 mo after floors were laid in apartments. The release of phthalates into the air observed under laboratory and natural conditions from some samples of the polyvinyl chloride materials should probably be attributed to dibutylphthalate (DBP) which had greater volatility than di-2-ethylhexylphthalate (DOP) and dicaprylphthalate (DCP). Therefore, it would be desirable to replace the DBP in the formal for polyvinyl chloride materials by DOP and DCP.

44731 **APTIC NO. 65033**

Audere, A. K., Z. Y. Lindberg, G. A. Smirnov, and L. M. Shabad

AN EXPERIMENT IN STUDYING THE INFLUENCE OF AN AIRPORT LOCATED WITHIN THE LIMITS OF A CITY ON THE LEVEL OF ENVIRONMENTAL POLLUTION BY BENZ(A)PYRENE. *(Opyt izucheniya vliyaniya aerodroma, raspolozhennogo v cherte goroda, na uroven zagryazneniya vneshney sredy benz(a)pyrenom). Gigiena i Sanit., 38(9):90-92. 2 refs. Translated from Russian, 5p.*

Aircraft exhaust emissions are a major source of benzo(a)pyrene. Samples of soil, snow, and vegetation in the vicinity of the Riga airport confirmed that aircraft was a source of benzo(a)pyrene. Although benzo(a)pyrene does break down, a large amount was accumulated in the area. The benzo(a)pyrene content varied from 0.19 to 2.16 micrograms/sq m/day in snow, from 6.3 to 41.8 micrograms/kg in soil at the same spot where the snow was collected, and from 2.1 to 20.7 micrograms/kg in vegetation. Concentrations in the vicinity of the runway were greater than at more distant points. Benzo(a)pyrene was eight to nine times greater than at the control region.

44732 **APTIC NO. 65024**

Gleizes, Claude

POLLUTION GENERATED BY VINIFICATION AND DISTILLATION OF WINE PRODUCTS. *Rhone-Mediterranean-Corsica Basin Agency (France), Forests and Waterways, 1973 (?). Translated from French, 35p.*

Grape processing operations produce an amount of pollution which, although it does not equal that of some industries, is nevertheless considerable. Distillation in particular discharges massive daily amounts of organic material during certain parts of the year. Vinification and distillation manufacturing techniques in relation to the pollution generated are discussed. The research program to develop purification processes and its initial results are described. Water pollution is caused during the harvest period by washing of the grapes. Other water pollution is caused during bottling and preparation of the wine. Coolant fluids and alcohol may be lost. The amount of water pollution and its composition in terms of biochemical oxygen demand for 5 days (BOD5), chemical oxygen demand (DOC), total materials in suspension (MIS), organic materials in suspension (OMIS), and pH, are described. Stagnating pools which are sites of fermentation and sources of offensive odor frequently accumulate; during storms, streaming returns the deposits to suspension. In some areas, the effluents are discharged to sewer systems. Control methods are discussed including rational organization of the collecting system, decreasing product losses, land disposal treatment, biological purification of the effluent, and pretreatment. Changes in purification procedures, reduction of daily pollution, recycling of piquette wash, steam treatment of marc and tartar extraction, distillation of lees, and treatment of distillery effluents can be used to control pollution from distillery operations. Costs are cited of various treatment processes for the liquid effluent.

44733 **APTIC NO. 65430**

Hare, Charles T. and Karl J. Springer

EXHAUST EMISSIONS FROM UNCONTROLLED VEHICLES AND RELATED EQUIPMENT USING INTERNAL COMBUSTION ENGINES FINAL REPORT. PART 5. HEAVY-DUTY FARM, CONSTRUCTION, AND INDUSTRIAL ENGINES. *Southwest Research Inst., San Antonio, Tex., Office of Air and Water Programs Contract EHS 70-108, Rept. APTD-1494, AR-898, 276p., Oct. 1973. 41 refs.*

NTIS: PB 232507/AS

Test data, documentation and discussion on detailed emissions characterization of eight diesel engines and four gasoline engines, as well as estimated emission factors and national emissions impact for farm, construction, and industrial applications are reported as part of a study of exhaust emissions from uncontrolled vehicles and related equipment using internal combustion engines. The exhaust products measured include total hydrocarbons, carbon monoxide, carbon dioxide, nitric oxide, oxygen, particulates, and smoke. Sulfur oxide emissions, evaporative losses of gasoline, and crankcase vent hydrocarbon emissions are estimated rather than measured. Emission factors and national impact are computed separately for each of the three applications for total hydrocarbons, CO, NOx, aldehydes, particulates, and SOx. The categories of engines covered in the report appear to make some significant, but not major, contributions to national pollutant totals from man-made sources.

44734 **APTIC NO. 65709**

Klose, Erhard, Manfred Hahn, Erich Kaltofen, and Guenter Mueller

SEMI-INDUSTRIAL EXPERIMENTS FOR THE MANUFACTURE OF LOW-SMOKING FUELS BY LOW TEMPERATURE CARBONIZATION OF HIGHLY VOLATILE HARD COAL INVOLVING GAS RECIRCULATION. *(Halbtechnische Versuche zur Herestellung von raucharmen Brennstoffen durch Spuelgasschwelung einer* *hochfluechtigen Steinkohle). Text in German. Freiberger Forschungsh. A, no. 521:33-57, 1973. 10 refs.*

For low-smoking fuels to burn without devloping soot and visible smoke, the concentration of volatile components must be below 20%. Natural low-smoking fuels are anthracite, lean coal, and forge coal. Semi-industrial experiments for low-temperature carbonization were performed with Rumanian hard coal from the Jiu Valley with a high concentration of volatile components. The ash content of the coal was 7.32% and the sulfur content 2.21%. The experimental aggregate had a throughput of 2 tons/day. The cross section of the round carburizer was 0.159 sq m, the cross section ratio between the experimental and a large-scale carburizer was 1 to 100. The total height of the dryer was 1.8 m and that of the carburizer 2.1 m. Five series of experiments were run, each lasting 12 hr. The specific shaft load was 525 to 660 kg/sq m/h corresponding to a throughput in the large industrial carburizers of 425 to 530 tons/day. The volatile matter dropped in all cases, with one exception, below 20%. The carbon and nitrogen concentration increased, and the hydrogen and oxygen concentration decreased. The ash conent increased on the average by 2.3%, while the sulfur concentration dropped slightly. The heating value of the low-temperature coke was 50 kcal/kg. Combustion experiments with the obtained coke revealed that it produced 14 times less soot and tar than the original hard coal. The sulfur emission was acceptable.

44735 **APTIC NO. 65046**

Kondakova, L. V., V. N. Krasnov, and Y. K. Shaposhnikov

ANALYSIS OF THE GASEOUS WASTE PRODUCTS FROM THE PRODUCTION OF STREPTOMYCIN. *(Analiz gasovykh vybrosov proizvodstva streptomitsina). Gigiena i Sanit., 38(8):89, Aug. 1973. Translated from Russian, 4p.*

A method of analysis for gaseous waste products from the production of streptomycin was developed and used to determine the composition of these products. The gaseous waste was passed through absorbers and condensed. The condensate was a dilute aqueous solution of organic substances in the gaseous waste products. The condensate was analyzed using the method of group analysis used for tap water. The products were composed of 50-80% neutral substances (primarily carbonyl compounds) and 15-30% acids. A small percentage consisted of organic bases and phenols. Each organic group was separated and subjected to further analysis by gas-liquid chromatography in combination with chemical methods, thin-layer chromatography, and infrared spectroscopy. The composition was very complex and included insignificant amounts of various classes of organic compounds. The best method to be used for purification of these emissions is therefore catalytic combustion.

44736 **APTIC NO. 65325**

Linden, Henry R.

REVIEW OF WORLD ENERGY SUPPLIES. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 1-41. 78 refs. (Sept. 10-14.)*

The projected increase in world energy requirements is related to the reserves and resources of fossil and fissile fuels. On the basis of currently definable technology and economics, world energy resources are insufficient to support historical rates of growth much beyond the middle of the 21st century. Conventional energy supply systems appear to be inadequate to support these growth rates under the expected limitations of the use of investment capital, raw materials, and air, water, and land resources. New energy supply systems are discussed, including those for conversion of the lower grades of fossil fuels to nonpolluting fluid fuels and those employing hydrogen as the energy form. The state of technological development of the most promising fossil fuel conversion processes and their thermal efficiencies, operating characteristics, investment costs, and prospects for industrial use are reviewed. Particular reference is made to the major commercialization effort already underway in the United States. The advantage of a hydrogen-based economy over complete electrification is discussed in detail. Although major emphasis is placed on the adequacy of fossil fuel and uranium resources in meeting future requirements and on delivery systems for these energy sources which are compatible with investment cost and environmental limitations, the major renewable energy resources are also reviewed briefly. (Author summary)

44737 **APTIC NO. 65036**

Perova, N. M. and A. N. Sergeyev

EXPERIMENTAL BASIS FOR HYGIENIC STANDARDS FOR SODIUM HEXAMETAPHOSPHATE AND TRIPOLYPHOSPHATE IN DRINKING WATER. *(Eksperimental noye obosnovaniye gigiyeniheskikh normativov geksametafosfat i tritolifosfata natriya v pit yevoy vode). Gigiena i Sanit., 38(9):19-22, Sept. 1973. 2 refs. Translated from Russian, 7p.*

Sodium hexametaphosphate and tripolyphosphate are widely used in various ways such as for washing textiles, tanning hides, production of rubber, and production of soap and shampoo. Sodium hexametaphosphate is also used in the water supply systems of industrial and heating systems as an anticorrosion agent. These substances can be introduced into tap water where they form slightly soluble compounds of calcium and magnesium, which are absorbed by the corrosion formations that are deposited on the walls of the pipes, so that the latter become dense and insulate the metal against the water. Although small doses of the materials are not harmful, larger quantities may be. The influence of sodium hexametaphosphate and tripolyphosphate on the organoleptic properties was studied, and the danger to the health of the population using drinking water containing these substances was determined. The influence of these substances on the odor and taste of water was determined using a panel. The action of these substances on white mice and rats was studied. The substances at concentrations used for constant processing of drinking water (10-20 mg/l) had no influence on odor, taste, color, or active reaction. Both substances formed a persistent cloudiness at concentrations above 5 mg/l when heated and when the tap water was boiled. The substances had no pronounced toxic or cumulative properties at concentrations proposed for drinking water. The limiting factor with respect to toxicity was at the level when formation of cloudiness occurred. The concentration of both substances should be kept at the 2.5 mg/l level.

44738 **APTIC NO. 65348**

Tazieff, H.

VOLCANISM AND ATMOSPHERIC CONDITIONS. *Beckman Instruments Process S.A., Geneva (Switzerland), Proc. Int. Symp. Environ. Meas., Geneva, Switzerland, 1973, p. 131-132. (Oct. 2-4.)*

Volcanoes emit solid particles, liquid particles, and gases into the atmosphere during volcanic eruptions and during continual exhalation of dormant and inactive volcanoes. Particulate matter ranges from 1000-100 million cu m for a single eruption. The amounts of matter emitted into the oceans and deposited on the oceans is greater than the amount emitted into the atmosphere. The volcanoes discharge carbon oxides, sulfur dioxide, hydrogen, hydrogen sulfide, halogens, and trace metals during dormancy.

44739 **APTIC NO. 65741**

Ussar, Max and W. Falbermayer

ENVIRONMENTAL POLLUTION - A PROBLEM OF POWER CONSUMPTION BY THE INDUSTRY. *(Umweltverschumutzung - ein Problem des Energieverbrauchs der Industrie). Text in German. Gas Wasser Waerme, 27(12):241-244, 1973.*

The major atmospheric pollutants and their effects are reviewed. They stem primarily from industries, followed by traffic and domestic heating. Of major concern for industry are sulfur dioxide and nitrogen oxides emissions. They stem from the combustion of fuel oils. In 1971, 0.60 kg sulfur dioxide/Gcal were emitted by industries burning light fuel oil which contains 0.3% sulfur. The NOx emission by these industrial complexes was 0.56 kg/Gcal. Through the combustion of medium heavy fuel oils containing 0.9% sulfur industry emitted 1.86 kg/SO2/Gcal and 1.13 kg NO/Gcal. Through the combustion of heavy fuel oil containing 2.0% sulfur 4.17 kg/SO2 and 1.27 kg NO/Gcal were thrown into the atmosphere. The list of industrial SO2 and NOx emission sources is headed by the iron producing industry with 26% and 22% of the total industrial emissions of SO2 and NO. It is followed by the stone and ceramic industry with 23% of the SO2 and 16% of the NOx. The chemical industry is responsible for 7% of the SO2 and 11% of the NOx, the paper industry for 11% of the SO2 and 10% of the NOx, foundries for less than 1% of the SO2 and 10% of the NOx, the non-ferrous metal metal industry for 1% of the SO2 and less than 1% of the NOx, the glass industry for 2% of the SO2 and 2% of the NOx and the remaining industry for 26% of the SO2 and 35% of the NOx.

44740 **APTIC NO. 65743**

Watanabe, Ikuo and Toshiichi Okita

DISTRIBUTION AND ESTIMATION OF MAIN SOURCES OF AMBIENT LIGHT HYDROCARBONS IN TOKYO. *(Taikichu teikyu tanka suiso kaku seibun nodo no jikoku hendo sogo kankei oyobi kaku seibun no hasseigen no suitei). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(5):710-728, Dec. 1973. 9 refs.*

Several series of sampling of light hydrocarbons in ambient air were made in 1970 and 1971. Air samples were taken every 30 to 60 min on a roof of the fifth story of the Institute of Public Health building in Minato-ku, Tokyo and measured by gas chromatography. A U-shaped trap was attached to a six-port sampling valve on a gas chromatograph. The sampling gas was passed through the trap which was chilled in liquid oxygen. The trap was then brought to 60-80 C by hot water, and its contents simultaneously were swept into the column. The diurnal variations of total light hydrocarbon concentrations indicated two peaks in a day and were very similar to those of sulfur dioxide concentrations at the Tokyo Tower, although the sources of HC and SO2 were apparently different. Therefore their concentrations were probably strongly affected by weather. The percentages of each HC in total HC are shown. The proportions of propane, isobutane and n-butane reached maximum at midnight, but those of propylene, I-butene, and isobutene which were active in photochemical reactions were approximately constant. The standard deviations of these variation of concentrations of these hydrocarbons increased in the following order: I-butene, isobutene less than propylene, less than n-pentane, less than isopentane, less than 2-methylpentane, 3-methylpentane, less than n-hexane, less than isobutane, less than n-butane, less than propane, less than acetylene. The correlation coefficients and the slopes of regression lines were also calculated between the concentrations of two different components, and the diagram of correlation was constructed. The correlations of isobutane-n-butane and isopentane-n-pentane were always significant. Thus, the main source of ambient hydrocarbons was automobile exhaust. To estimate the contribution of the source to ambient hydrocarbons, HC concentrations were measured at various sources. The main sources of ambient propane, isobutane, n-butane, isopentane, and n-pentane were the exhaust gases from gasoline A, gasoline B, and propane, gasoline vapor, and leaking of liquid propane gas. The rate of the contribution of these five sources can be calculated supposing that the gasoline A/gasoline B ratio is the same as that described in 1969. The validity of the supposition can be tested using isobutane concentrations, and is proved by the agreement between the actual and calculated values. The proportions of source strength of propane-powered automobiles to that of gasoline-powered autos were calculated and the diurnal variations shown. The propane-driven taxis are relatively abundant at midnight.

44741 **APTIC NO. 65019**

Japan Environmental Agency, Bureau of Atmospheric Safety

RESULTS OF A SURVEY ON THE POSITION OCCUPIED BY AIRCRAFT IN ATMOSPHERIC POLLUTION. *(Taiki osen ni shimeru kokui no ichi chosa kekka). p. 79-95, Nov. 7, 1973. Translated from Japanese, 48p.*

Environmental pollution at Osaka and Haneda airport was surveyed in several studies. The results of these surveys are presented and discussed. Aircraft exhaust varies in composition according to the aircraft modes of idling, takeoff, climbing, and approach. Main pollutants are carbon monoxide, nitrogen oxides, total hydrocarbons, total aldehydes, and cyanogen as hydrogen cyanide. These pollutants were measured during the various engine modes during the different tests. The results are compared. Data was also obtained on the average numbers of planes arriving and departing from the airport, of the length of time the aircraft spent at the various engine operating modes, and of the amounts of pollutants discharged by different types of aircraft. These data were used to calculate the total amount of pollution discharged daily. The total emissions of carbon monoxide, hydrocarbons, and nitrogen oxides from Haneda airport with 426 planes/day were 10,179, 6205, and 3160 kg/day, respectively. Emission factors in the area around Tokyo Bay were also determined for CO, HC, and NOx from autos, power generation, industry, commerce, homes, and aircraft. When the total emissions from stationary sources and aircraft were compared, it was calculated that airport emissions might equal the emissions of 100 smokestacks or of 0.5 smokestacks, depending on which type of smokestack was chosen for comparison. The amount of pollution emitted by aircraft was calculated as 1/100-1/300 of the amount emitted by automobiles. Although aircraft produces a minor part of all pollution, the emissions can still cause heavy concentrations around the airport. The amounts of NOx, HC, and CO emitted by aircraft were compared with those for automobiles. Air quality was measured near Osaka airport at various points in the airport, and hourly fluctuations at the points were determined. Air quality at the airport was then compared with air quality at the Furuedai elementary school in Suita.

44742 **APTIC NO. 65668**

Iwakuni Municipal Government (Japan), Public Nuisance Section

A SURVEY OF PUBLIC NUISANCES IN IWAKUNI CITY (NO. 5). *(Iwakuni-shi no kogai gaikyo). Text in Japanese. 422p., Dec. 1973.*

The city of Iwakuni comprises the foothill area along the Nishiki River, the flatland in the delta of the river, and a flat belt industrial area along the coast of the Inland Sea. But only 20% of the city is less than 20 m in altitude and the major part is slightly hilly. The coastal area is occupied by a large petrochemical complex which runs into the contiguous Otake city. From the north, petroleum refining, petrochemical, pulp, chemical synthetic, chemical machinery, thermal power, and construction material factories share the entire coastline. In the old city proper, the total number of small factories is 431, consisting of 23.7% food processing, 14.8% metal fabricating, and 13.2% furniture manufacturing plants. The city's air pollution monitoring system is equippped with 13 dust deposit gauges, 21 lead dioxide sulfur dioxide meters, two gas detectors, one anemometer, five trace wind anemometers, one automatic gas sampling device, one high-vol air sampler, and five sulfur oxide automatic recorders. In addition, there are a number of advanced meteorological mechanical devices. As of 1973, there were 10 continuous monitoring stations in Iwakuni and one station in the adjoining Waki township. Though not at all stations and not in all categories, SOx, suspended particulates, nitrogen oxides, carbon monoxide, oxidants, hydrocarbons, wind direction and speed, temperature, humidity, and sunshine are monitored, and a telemetry system, part of which is already functioning, will be completed by 1975. The city's administrative system and policy are discussed and measurements are presented.

1972

44743 **APTIC NO. 65400**

Vikhert, M. M. and T. R. Filiposyants

SMOKE EMISSION AND TOXICITY OF THE EXHAUST GASES OF MODERN DIESEL ENGINES. *(Dymnost i toksichnost sovremennykh dizeley). Text in Russian. Avtomob. Prom., 38(9):6-8, 1972. 4 refs.*

The smoke, nitrogen dioxide, carbon monoxide, and unburnt hydrocarbon emissions from different types of modern diesel engines were measured under different operating conditions. Smoking was most intense under peak load conditions and under mean effective pressures exceeding 4-5 kp/sq cm. The NO2 emission was highest at the highest temperatures in all types of engines, but lowest in turbulent-chamber diesels. The unburnt hydrocarbon emissions were highest at low combustion temperatures and under conditions of air-deficit. The emission was lowest in nearly all engines under mean effective pressures of 3-5 kp/sq cm. The CO emissions were due to incomplete mixture formation and short reaction time, and increased with engine load.

44744 **APTIC NO. 65387**

American Petroleum Inst.

FINAL REPORT OF THE TASK FORCE ON USED OIL DISPOSAL. *API Publication 4036, 46p., 1972 (?).*

A task force study of nonpolluting methods of waste disposal is summarized. The used oil can be disposed of at the source by the user; at some other location by the waste oil collector; or in the case of automotive used oil, it may be reprocessed to a fuel, low grade industrial oil, or a re-refined lubricating oil. Extensive burning tests indicate that waste crankcase oil can be safely added to residual fuel oil in mixtures up to 25% and burned to produce useful heat. In one study, visible smoke at all normal burning rates was light, even with use of 100% waste oil. High concentrations of waste oil produced a light colored plume. Smoke tapes on the 5% blend of waste oil rated from 2 to 4 on the Bachrach Smoke scale at firing rates of 75 and 120 GPH, respectively. In another study, there was a substantial buildup of ash on the bottom of the firebox. Lead emissions can reach up to 28% in on-site burning of a 25% waste crankcase oil/75% no. 2 fuel blend at 3 GPH.

44745 **APTIC NO. 65404**

Environmental Protection Agency, Research Triangle Park, N. C., Office of Air Programs

HELENA VALLEY, MONTANA, AREA ENVIRONMENTAL POLLUTION STUDY. *Rept. AP-91, 194p, Jan. 1972. 83 refs.*

NTIS: PB 207 126

The types, amounts, sources, distribution, and effects of pollution were studied in the Helena Valley area. Air, water, and soil were examined for contamination by arsenic, cadmium, lead, and zinc. In addition, airborne sulfur dioxide was measured. All measurements were made between June 1969 and June 1970. The investigation concerned contamination of the environment from the industrial smelting complex in the city of East Helena. Atmospheric concentrations of SO2 in the Helena Valley exceed Montana air quality standards and levels reported in Federal criteria to be associated with deleterious effects on human health, vegetation, and materials. Industrial operations in East Helena are the responsible sources. Air, water, and soil are contaminated with heavy metals from the East Helena smelting complex. Arsenic, Cd, and Pb, which are emitted as air pollutants from both plants, settle and accumulate in soil and on vegetation to an extent surpassing levels that are toxic to grazing farm animals. Evidence indicates that sub-clinical effects could be occurring in humans. (Author abstract)

1971

44746 **APTIC NO. 65275**

Lemaigre, M. P.

AIR POLLUTION AND AUTOMOBILES. *(La pollution atmospherique et l automobile). Text in French. Bulletin de Documentation de la Societe du Controle et d Exploitation des Transports Auxiliares No. 245, 17p., July 22, 1971.*

The effects of the major components of automotive exhaust on the human organism are reviewed, and the ways of abating toxic emissions from vehicles are described. Carbon monoxide, while being a dangerous component of automotive exhaust, is rapidly dispersed in the atmosphere. Smoking entails even higher degree of exposure to CO than exhaust gases in city streets. Smoking is also partly responsible for the lead level in the blood, as the blood of smoking rural dwellers contains largely the same quantity of lead as that of non-smoking urban dwellers. As demonstrated by an epidemiological survey covering some 12,000,000 inhabitants concerning the incidence of lung cancer, the role played by smoking in lung cancer is 8 to 10 times greater than the role of industrial, domestic heating, and traffic emissions combined. Traffic-generated emissions can be abated by the use of novel fuels, such as natural gas or liquefied natural gas, or of novel power plants, such as the Stirling motor, electric motors powered by batteries or fuel cells, or vapor engines. Regular idle adjustment is the most important short-term measure for abating CO emissions.

44747 **APTIC NO. 65359**

Maile, Hand, Erwin Frueh, and Hermann Bucher

ATMOSPHERIC AIR GAS BURNER. *(Atmosphaerischer Gasbrenner, bei welchem der Coanda-Effekt ausgenutzt wird). Text in German. (Junkers and Co. GmbH, Wernau (Germany)) W. Ger. Pat. Appl. 1,937,798. 3p., Feb. 4, 1971. 2 refs. (3 claims).*

Gas is fed into a chamber while the air is supplied through a tubular ring the end of which is moulded to give rise to the Coanda effect. As a result, the gas discharged through the annular slot is deflected towards the tubular ring along which it flows at a high rate. The downstream ring slot and deflector provide a further enhancement for the Coanda effect.

1965

44748 **APTIC NO. 65272**

Bush, A. F. and E. S. C. Bowler

ELECTRON MICROSCOPY STUDIES OF A COAL FIRED STEAMELECTRIC GENERATING STACK DISCHARGE. *Univ. of California, Los Angeles, Dept. of Engineering, Rept. S. I. 395, 19p., Dec. 1965.*

Particulate emissions from coal-fired boilers were sampled ahead of and following the electrostatic precipitator collector in an industrial plant. The samples were analyzed with an electron microscope. Particle size classification was made using 0.03 micron groupings, ranging from 0.07 to 0.31 micron. Particles above 1/10th of a micron in size were easily resolved and counted. The results were expressed in terms of percent of the total number that was less than the classification studied and were plotted on log probability paper to determine the geometric mean and the standard geometric deviation for the size classifications. The number of particles per cu ft of air ranged from 42 times 10 to the 9th power to 147 times 10 to the 9th power for all of the samples counted.

1960

44749 **APTIC NO. 65301**

Bush, A. F. and E. S. C. Bowler

ELECTRON MICROSCOPY STUDIES OF STEAMELECTRIC GENERATING STACK DISCHARGES. *California Univ., Los Angeles, Dept. of Engineering, Rept. C 60-79, SI 8007, 19p., 1960.*

Samples were collected of the stack discharge effluent of four different steam electric generating plants to determine by electron microscopy the particle size and count determination of each. Particles down to 0.01 of a micron were resolved. The size classification was not of uniform distribution, and there were particle sizes which predominated. Several of these showed a bi-modal distribution with exceptionally large numbers of fine particles occurring in two plants. There was a variation in the nature of particles emitted from the different power plants. Visible plumes were seen when the stack gas contained both small particles .02 to .04 micron diameters and larger particles with 1 to 2 micron diameters in high concentrations, 500 times 10 to the 9th power/cu ft of air. Most of these were in the small group, approximately 90%. From the standpoint of light scattering and obscuring ability, the high count of particles between .01 micron and 1 micron diameters may be of the most significance.

CONTROL METHODS

1974

44750 **APTIC NO. 68120**

Anderson, J. G.

THE ENERGY DILEMMA. *Automotive Des. Eng., vol. 13:12-13, July/Aug. 1974. 4 refs.*

The need for energy conservation is tempering demands for automotive exhaust emission control. With the current need to maximize gasoline production, demands to tailor gasoline quality for emission controls should be reassessed. In the past, anti- knock quality of gasoline has been improved, the cost of producing high octane fuel has been justified in a reduction of cost/mile, and compression ratios that gave the best economy were used. A sensible balance between compression ratios and octane number was reached about a decade ago. If compression ratios are raised above 10:1, mechanical problems might arise and further improvements in gasoline quality will be impossible. Improved anti-knock quality and removal of lead could increase cost and reduce yield of gasoline. Generally, gasoline yield is inversely proportional to the amount of upgrading involved in the refinery process. Lead traps and cyclones could be used to remove lead emissions without decreasing gasoline yield. If lead is reduced to low levels or removed, both Research and Motor octane numbers will have to be reduced, or the cost will increase and gasoline yield will decrease. Compression ratios may have to be reduced to cope with lower octane, with adverse effects on economy. Engine design changes such as improved carburetion, better manifold design, and high compression ratios for high thermal efficiency can be used to remove carbon monoxide and hydrocarbons. Recirculation of exhaust to reduce nitrogen oxides is wasteful, and the use of thermal reactors should be avoided since it increases fuel consumption. Doubts about catalyst durability and safety and increased costs and fuel consumption occur with catalytic converters.

44751 **APTIC NO. 65302**

Aoi, Katashi

IMPROVEMENTS IN OR RELATING TO THE CLEANING OF EXHAUST GAS CLEANING APPARATUS. *(Assignee not given.) Brit. Pat. 1,343,744. 9p., Jan. 16, 1974. (Appl. Feb. 14, 1972, 22 claims).*

An exhaust gas cleaning apparatus which cleans out accumulated waste matter is described. This apparatus overcomes the disadvantage of other apparatus in which solid particulate material from exhaust gas is collected in a mass of filter material which deteriorates over a period of time, particularly as a result of clogging of the filter material with the solid particulate material. The apparatus consists of a cylindrical gas expansion chamber with adiabatic expansion chambers, condensing chambers, and collector chambers within it. Air, steam, or the exhaust gas is injected into the collector chamber to flush out the solid particulate matter. The fluid passes through a replaceable cartridge containing filter material, and the solids drop out under gravity. The apparatus can be cleaned without dismantling it and can store a predetermined amount of waste. The cleaning can be successuflly repeated many times without the need for removal of the wastes. The apparatus can be used in internal combustion engines.

44752 **APTIC NO. 65532**

Balch, George E.

EXPERIENCE WITH CLOSED PIPELINE CHARGING OF COKE OVENS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1974. 2 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-180.)*

The first major tall oven installation of a new process utilizing a closed system for the charging of coal into coke ovens is described. The coal is first preheated and introduced into the individual ovens via a pipeline. The system is closed except for the exhaust from a venturi scrubber which cleans excess gases from the coal preheater to the degree required by the Wayne County, Mich. regulations before being discharged to the atmosphere. This new process eliminates the source of visible particulate and gaseous emissions which occur from the universally used conventional larry car charging technique. The prototype unit includes improved battery top working conditions; elimination of the need to level the coal charge and its associated emissions; reduction of visible emissions related to the pushing of discharging of the hot coke at the end of the coking cycle; and increased throughput of the ovens by as much as 54% by virtue of the shortening of the coking cycle as a result of the introduction of a preheated coal charge into the oven in place of the wet, cold conventional charge. (Author abstract modified)

44753 **APTIC NO. 65611**

Balogh, Erno

THE DEVELOPMENT OF THE REMOTE HEATING SYSTEM IN TATABANYA (HUNGARY) AND ITS EFFECT ON ENVIRONMENTAL POLLUTION. *(Tatabanya varos tavfutesenek fejlodese es hatasa a kornyezetszennyezodes csokkentesere). Text in Hungarian. Energia Atomtech. (Budapest), 27(5):214-219, 1974. 12 refs.*

The development of a remote heating system in the city of Tatabanya, Hungary, and of the sulfur dioxide and settling dust levels during the last 2 decades is surveyed. The falling dust levels and SO2 concentrations as measured in 1971 averaged 318 tons/sq km and 0.42 mg/cu m, which represents practically no change from the 1954-1955 period despite a spectacular increase in the number of dwelling units that have been connected to the remote heating system since that time. The high settling dust and SO2 levels are due to the power plants from which the thermal energy for remote heating is derived; further to domestic heating using cheap, sulfurous coal, and industrial activity. The environmental advantages deriving from remote heating and especially from the high efficiency of the power plant boilers compared with domestic heating installations are partly wiped out by the use of coal with lower calorific value in the power plants, and of 50-meter stacks which are unable to provide for sufficient dispersion of the pollutant. Drastic improvement in air quality with SO2 concentrations of 0.2-0.4 mg/cu m, are expected from a new 160 m high power plant stack.

44754 **APTIC NO. 65498**

Beckman, W. A. and J. A. Duffie

SOLAR HEATING AND COOLING OF BUILDINGS. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th, Symp. Sol. Energy Util., Washington, D. C., 1974, p. 51-74. 40 refs. (April 30.)*

Many of the building heating and cooling systems that have been proposed, analyzed, and/or tested since 1937 are reviewed. Solar heating systems have been studied and use for some time, bue combined systems for heating and cooling have not yet received the same attention. A simulation method for solar cooling and/or heating is discussed. The simulations can be used to evaluate systems, predict their thermal performance, and evaluate the effects of design changes. The results of a particular simulation are used to illustrate a method of economic analysis. (Author abstract modified)

44755 **APTIC NO. 65261**

Berlie, Elmer M., Richard K. Kerr, and Robin P. Rankine

THE ROLE OF THE CLAUS SULPHUR RECOVERY PROCESS IN MINIMIZING AIR POLLUTION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 24p., 1974. 9 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-135.)*

A thermodynamic equilibrium model was used to predict field and laboratory performance of the Claus process. Theoretical recovery efficiencies with four catalytic stages of conversion were predicted at 99.5% and efficiencies as high as 99.1% were observed in field tests on a large scale operating plant. Progress was made in both the laboratory and the field to overcome persistent catalyst problems arising from design limitations, operating procedures, and plant upsets. Developments in process design, performance evaluation, catalyst testing, and process optimization control systems give indications that these efficiencies can be sustained over the long term. Sulfur recovery plants with modern design offer a viable alternative to adding on tail gas clean up methods for attainment of the emission levels specified by most regulatory agencies. A plant operating at 99.5% on a rich feed should have sulfur dioxide concentrations in the incinerator stack of approximately 1000 ppm. Upgrading of existing Claus plants or new plants designed to attain high recovery efficiencies have the advantage of using one process principle which simplifies operation and control and minimizes capital, maintenance, and operating costs. (Author abstract modified)

44756 **APTIC NO. 65026**

Blackwood, T. R. and W. H. Hedley

EFFICIENCIES IN POWER GENERATION (FINAL REPORT). *Monsanto Research Corp., Dayton, Ohio, Environmental Protection Agency Contract 68-02-01320, Task 7, Program Element 1AB013, ROAP 21ADE-29, Rept. EPA-650/2-74-021, Rept. MRC-DA-404, 49p., March 1974. 29 refs.*

NTIS: PB 234160/AS

Ways of using or converting energy are discussed, and thermodynamic limiting present and future efficiencies are compared. Efficiency limiting factors, possible general routes for process improvement, and relevent on-going research and development are discussed. More study is required in several of the following areas: atmospheric fluidized bed combustion, automotive, bottoming cycle, chemical coal cleaning systems, chemically active fluidized bed combustion, coal cleaning plants, coal liquefaction, combined cycle (gas and steam), conventional boilers, conventional boilers plus flue gas cleaning, conversion of coal to methanol, diesel, Feher cycle, fuel cells, gas turbines, high-Btu gas generation, low-Btu gas generation, magnetohydrodynamics, nuclear power plants, potassium topping cycle, pressurized fluuidized bed combustion, residual oil desulfurization, and steam turbines. (Author abstract)

44757 **APTIC NO. 68134**

Bress, Dellason F. and Carmen A. Petrarca

POLLUTION ELIMINATION FOR FERTILIZER PROCESS. *(Foster Wheeler Corp., Livingston, N. J.) U. S. Pat. 3,798,021. 10p., March 19, 1974. 2 refs. (Appl. Aug. 21, 1972, 18 claims).*

A continuous ammonium nitrate process for fertilizer manufacturing is described which returns to the process both neutralizer and prill tower wastes (nitric oxide, nitric acid, and ammonium nitrate solids) ordinarily exhausted to the atmosphere or condensed and conveyed into a sewer line. The stream containing water, vapor, and contaminants produced during the manufacture of fertilizer is passed into a heat exchange zone in indirect heat exchange relation with a second stream containing air and entrained fertilizer solids such that a portion of the water, vapor, and contaminants from the first stream are condensed to increase the water carrying capacity of the second stream. The condensed portion of the first stream is recirculated in countercurrent contact with the second stream from the heat exchange zone such that water free of contaminants is vaporized from the condensed portion of the first stream and entrained solids are removed from the second stream. Pure water and air are removed, and a fertilizer containing solution is produced which can be used in the manufacture of fertilizer. An embodiment of the process for production of urea involves the use of a first stream consisting of low pressure steam which is a by-product of the urea process. A second stream contains air and entrained fertilizer solids. A third liquid stream containing dilute fertilizer concentrations is passed in indirect heat exchange relation with the first stream. (Author summary modified)

44758 **APTIC NO. 65257**

Burkart, Joseph K., Robert G. Hinners, and Myron Malanchuk

CATALYTIC CONVERTER EXHAUST EMISSIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 25p., 1974. 17 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-129.)*

The system and aerometry aspects of Toxicologic Assessment of Mobile Emissions (TAME) animal exposure studies conducted to demonstrate biological effects are discussed. Aerometry data on emissions at the exposure chambers and other parts of the system are presented for four animal exposure studies with a 1973 Chevrolet CID engine operated on the California cycle. Steady speed runs were made without animals to verify the presence of a highly acidic particulate. The particulate was collected on quartz fiber filters and aqueous extracts of some were analyzed for particular ionized radicals as the sulfate and nitrate groups. At 15 mph steady speed, the relative acidity was 65 times that with the catalyst removed. With the use of the catalyst and high sulfur fuel, the relative acidity rose to 260 times that without the catalyst and high sulfur fuel. Also the sulfate in the particulate increased to 4.33 mg/cu m and even more with the high S fuel, 14.20 mg/cu m. With the catalyst, when cycling, carbon monoxide was reduced 93% and hydrocarbons 80%; aldehydes were almost totally eliminated, and photochemical reactivity was reduced. Under the hot cycling condition, with the catalyst removed, CO, hydrocarbons, and photochemical reactivity increased, and the bulk of the particulate became organic in nature. At steady speeds, total particulate and sulfate in the particulate (0.58 mg/cu m) was reduced and relative acidity of the particulate extract was neutral. (Author abstract modified)

44759 **APTIC NO. 65496**

Cherry, William R.

SOLAR ENERGY RESEARCH AND UTILIZATION. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th, Symp. Sol. Energy Util., Washington, D. C., 1974, p. 1-20. 19 refs. (April 30.)*

The gas and oil shortages of the 1970 s are forewarnings of more serious energy deficiencies to come near the turn of the century. Solar energy processes are on the verge of commercial readiness to help the nation utilize this enormous, renewable clean source for future energy needs. Solar energy will play a major role in the heating and cooling of buildings, the production of renewable gaseous, liquid, and solid fuels, and the production of electric power by ocean thermal power, directly, by wind power, and by photovoltaic electric power generation over the next 45 years. Potential impacts on the various energy markets and estimated costs of such systems are discussed, along with illustrations of some of the processes to accomplish the goals. It is expected that at least 20% of the U. S. total energy requirements by 2020 will be derived from solar energy. This is nearly equivalent to the total energy consumed by the U. S. in 1970. From this harnessed solar energy, at least 35% of the building heating and cooling requirement, at least 30% of the Nation s gaseous fuel requirement, 10% of the liquid fuel requirement, and 20% of the Nation s electrical power demand can be obtained. A research and development program on solar energy was recommended which would cost $3,520 million for 15 years. The actual funded program for 1973 was 4.2 million dollars, for 1974 was 13.2 million, for 1975 was 32.5 million, and for 1975-1979 was 200 million dollars. (Author conclusions modified)

44760 **APTIC NO. 65649**

Collins, J. J., L. L. Fornoff, K. D. Manchanda, W. C. Miller, and D. C. Lovell

THE PURASIV S PROCESS FOR REMOVING ACID PLANT TAIL GAS. *Chem. Eng. Progr., 70(6):58-62, June 1974.*

The PuraSiv S process, a commercially demonstrated system for the removal and recovery of sulfur dioxide from sulfuric acid plant tail gas, is discussed and described. The SO2 is adsorbed on a tailor-made molecular sieve adsorbent. Upon the regeneration of the molecular sieve, the SO2 is recycled to the front end of the acid plant for recovery and conversion to H2SO4. Typically, the recovered SO2 contributes a 2 to 3% increase in the H2SO4 production rate. The molecular sieve is equally effective in removing SO2 in the presence of 7-10% carbon dioxide and trace amounts of nitrogen oxides found in sludge acid plant vent gas. The commercial experience with this system at Coulton Chemical Corporation s 200-ton/day spent acid plant is described. In the commercial unit, SO2 in the tail gas is reduced to less than 50 ppm. Operation of the unit is fully automatic, requiring only an occasional check by the acid plant operator. Total treating costs for an add-on PuraSiv S unit range from $1 to $2.25/ton of acid, depending upon acid plant size and the concentration of SO2 in the tail gas leaving the absorber tower. Treating costs for a new plant would be approximately 20% less if the PuraSiv S unit is included in the initial design of the plant. Based on the first six months of operation, the PuraSiv S unit at Coulton has a net treating cost of $1.93/ton of acid produced. Because the cyclic life of the adsorbent is guaranteed, this is the maximum treating cost. The standard PuraSiv S unit can process a feed containing 3500 ppm by volume SO2 and can be extended to higher concentrations by including additional molecular sieve in the vessels. This permits a richer SO2 gas strength to the converter in the base acid plant. For a new plant, the size of the acid plant can be reduced by handling a stronger gas. In an existing plant, it is possible to increase production by increasing the SO2 strength to the converter. (Author conclusions modified)

44761 **APTIC NO. 65155**

Daidoji, Ken, Toshihiro Mitake, and Ippei Hara

A STUDY ON A DETOXIFICATION TREATMENT FOR GASOLINE ENGINE EXHAUST GASES. *(Gasorin kikan no haiki gasu gedoku shori ni kansuru jakkan no kiyo). Text in Japanese. Preprint, Japan Society for Mechanical Engineering, p. 78-82, 1974. 7 refs. (Presented at the Japan Society for Mechanical Engineering Hamamatsu Meeting, Sept. 2, 1974.)*

The carbon monoxide and nitrogen oxides content in engine exhaust gas can be reduced by increasing the amount of residual gas in the cylinder or combustion chamber; this can be achieved by decreasing the intake pressure and increasing the back pressure of the exhaust. For decreasing the intake pressure, a vortex mechanism is installed between the carburetor outlet and intake pipe and a separator made of a regenerative light alloy is installed between the intake pipe outlet and the mixed gas inlet of the cylinder head. The increase in flow resistance by the vortex effect results in an increase of the residual gas in the cylinder. To increase the back pressure, a similar separator is installed between the exhaust gas outlet of the cylinder head and the exhaust pipe. The exhaust gas is recirculated into the vortexer through a conduit. The heat transfer from the exhaust gas outlet to mixed gas intake is carried out by the spacer. The effect of vortexer, spacer, and exhaust gas recirculation and a combination of these were tested and evaluated by setting the performance of the existing engine as the standard. A significant decrease in the relative ratio of CO by the dilution of mixed gas and a decrease in nitric oxide were observed. However, a reduction in output power due to the increase in residual gas in the cylinder is inevitable.

44762 **APTIC NO. 65596**

De Soete, G.

VARIOUS PARAMETERS INFLUENCING NITRIC OXIDE FORMATION IN GASOLINE AND DIESEL ENGINES, AND EMISSION CONTROL TECHNIQUES. *(De verschillende parameters welke een invloed hebben op de stikstofoxidevorming bij benzine- en dieselmotoren, alsook de kontroletechnieken). Text in Dutch. Ingenieursblad, 43(10): 322-333, 1974. 13 refs.*

The mechanisms of the formation of nitric oxide in gasoline and diesel engines, and practical NO emission control measures adaptable to such engines are discussed. Nitric oxide is mostly from fuel nitrogen, and, at a lower reaction rate, from air nitrogen primarily in the flame front and in the zone of the reaction products. The NO emission in general is primarily determined by the combustion temperature, the air excess coefficient, the pressure, and by the duration of the combustion process. In gasoline engines, the NO emission is primarily determined by the air excess coefficient, with a value of 0.95 leading to maximum emission. Indirectly, it is dependent on the inlet and end pressure in the cylinder and the reaction time. The NO emission is highest when both the specific fuel consumption and the carbon monoxide are lowest. In diesel engines, increases of the compression ratio and end pressure increase the NO emission. In both gasoline and diesel engines, the NO emission can be abated by modifying the compression ratio, the use of advanced ignition and injection, and by water injection. Cooled precompression and modification of the rate of injection are applicable in diesel engines. The use of stratified charge and exhaust gas recirculation are promising measures in both types of engines, while catalytic exhaust gas purification is reserved for gasoline engines.

44763 **APTIC NO. 65423**

Dealy, James O. and Authur M. Killin

ENGINEERING AND COST STUDY OF THE FERROALLOY INDUSTRY. *Office of Air Quality Planning and Standards, Research Triangle Park, N. C., Office of Air and Waste Management Rept. EPA-450/2-74-008, 410p., May 1974. 36 refs.*

An air pollution control engineering and cost study is presented for the ferroalloy industry. Topics covered include: ferroalloy manufacture, sources and characteristics of emissions, various control systems for limiting the emissions (scrubbers, electrostatic precipitators, cloth filters), emission control guidelines, the economics of emission control, and recommended research and development programs. Appendices are provided covering descriptions of Environmental Protection Agency source tests, sampling and analytical techniques, visible emissions reported from EPA tests and questionnaire data, particle size analysis, chemical analysis of particulate emissions from ferroalloy smelting operations, and imports of reactive metals and alloys to the United States.

44764 **APTIC NO. 65650**

Dean, K. C., Richard Havens, and M. W. Glantz

METHODS AND COSTS FOR STABILIZING FINE-SIZED MINERAL WASTES. *Bureau of Mines, Salt Lake City, Utah, Salt Lake City Metallurgy Research Center, Rept. of Investigations 7896, 30p., 1974. 6 refs.*

Field and laboratory tests of stabilizing fine-sized mineral wastes, and the methods and costs for stabilizing wastes are reviewed. Fine-sized mineral wastes discarded by ore milling plants require stabilization to prevent air and water pollution. Stabilization can be attained by physical, chemical, vegetative, and combination procedures. Vegetative reclamation is preferred to physical and chemical stabilization, but is difficult to achieve because the wastes are sterile, contain deleterious inorganic salts, and lack the essential nutrients and physical characteristics required for sustaining vegetative growth. Methods now have been developed to attain vegetative growth on all but excessively acidic, basic, or saline tailings at costs ranging from 120 to 650 dollars/acre. The cost for stabilizing tailings requiring more intensive treatment techniques may range upward to $1750/acre. Procedures developed by the Bureau of Mines and industry for vegetating amenable tailings are described. Costs for the various processes are listed, and procedures that may be applicable for stabilizing saline and pyrite-containing tailings are suggested. Ridged planting beds, drip irrigation, and deep-furrow planting techniques are suggested for stabilizing saline wastes. A combination of mill tailings and sewage sludge can be used for producing synthetic soils, and layers of sewage sludge buried under a layer of tailings offer promise of inhibiting acid formation from oxidation of sulfides in mineral wastes. Pelletization of tailings to improve physical structure is beneficial in establishing a vegetative cover. Nitrogen fertilization maintenance costs for vegetatively stabilized tailings can be reduced by use of nitrogen-fixing native plant species such as Indian ricegrass. Microvegetative growth can be ashieved on tailings and offers promise over macroscopic forms on tailings in arid regions, but the algae, lichens, and mosses are as subject to salinity stresses as the larger plant species. (Author abstract modified)

44765 **APTIC NO. 65372**

Dickerson, R. A. and A. S. Okuda

DESIGN OF AN OPTIMUM DISTILLATE OIL BURNER FOR CONTROL OF POLLUTANT EMISSIONS (FINAL REPORT). *Rockwell International, Canoga Park, Calif., Rocketdyne Div., Environmental Protection Agency Contract 68-02-0017, ROAP No. 21ADG-44, Program Element 1AB014, Rept. EPA-650/2-74-047, 268p., June 1974.*

Studies were performed on optimizing burner design of high pressure atomizing No. 2 distillate fuel oil burners for the reduction of pollutant emissions when firing into refractory-lined combustion chambers. The atomizing characteristics and flow as well as the composition profiles in the combustion zones of several commercial burners were determined experimentally. Mass median droplet diameters were 60-90 micron for 0.50-1.50 gph oil spray nozzles. Nitric oxide formation was most prevalent in the near-stoichiometric combustion zones where local flow conditions led to vigorous gas mixing. The data were used to design optimum geometry burners which were fabricated in fixed-geometry versions and tested extensively to verify their low air pollutant emissions. Substantial reductions of about 50% in NO emissions were achieved by optimizing conventional designs; emissions of other pollutants were negligible. Several nonconventional burner designs were also built and tested, with two leading to a very low NO emissions.

44766 **APTIC NO. 65578**

DiGiacomo, J. D. and H. T. Lindland

AN ECONOMICAL DESIGN FOR A SOLVENT FUME INCINERATOR. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 18p., 1974. 11 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-257.)*

A thermal incineration system designed from a basic computer program for controlling solvent emissions is presented. Hydrocarbons and their derivatives are significant factors in air pollution due to their photochemical reactivity. Both paraffins and olefins can react with nitrogen oxides to produce smog, vegetation damage, eye irritation, and oxidants as well as affecting the esthetic quality of life. The incinerator utilizes two nozzles mixing dual fuel burners firing perpendicularly to the fume stream and a single pass, air-to-air flat tube heat exchanger. System efficiency is maximized by using a portion of the fume stream for the combustion air requirement of the burners. These features reduce fuel consumption by 50%. Flame stability and complete combustion, whether firing gas or oil, is achieved by means of a cast iron mixing cone which is unaffected by incinerator operating temperatures. This maximizes turbulence and mixing. Installation costs are reduced because of the simplicity of the afterburner system. Complicated air and fuel piping is eliminated. Operating costs are reduced because the burner can utilize either gas or oil as a fuel. Maintenance costs are reduced because of the easy changeover from gas to oil. The dual fuel capability enables the user to judiciously purchase and allocate increasingly scarce fuel supplies. (Author abstract modified)

44767 **APTIC NO. 65638**

Droscha, Hellmut

HEAT AND ELECTRIC POWER FROM PRESSURE GASIFIED COAL. *(Waerme und Strom aus druckvergaster Kohle). Text in German. Technica, 23(17):1403-1404, 1974.*

An integrated coal pressure gasification and power generating pilot plant with a capacity of about 170 MW has been erected in Luenen, Westphalia, Federal Republic of Germany. A full-size plant is already under development. The main operating materials are coal, water, and air. The hot gas produced from coal first passes a scrubbing cooler and then drives with a pressure at 20 atm an auxiliary turbine which is succeeded by a compressor where preliminarily compressed air is further compressed to the pressure required for coal gasification. The gas, which now leaves the auxiliary turbine with a lower pressure, enters the combustion chamber of the steam boiler where it is burned together with compressed air at which process a high amount of heat is liberated. This is used for generation of high-pressure steam. At the same time the combustion gases drive the main gas turbine. The steam with a pressure of 130 atm and a temperature of 525 C drives the steam turbine of the system whose generator produces the main quantity of electric energy. The plant works with an efficiency of 43%. The pollutant emission is down to 1/4 of the emission of conventional plants. The dust and fluorine emission has been eliminated almost entirely, the emission of oxides of sulfur has been reduced by 90% and that of the oxides of nitrogen has been cut to 1/2.

44768 **APTIC NO. 65228**

Dunbar, David R., Kenneth Axetell, Jr., and George A. Jutze

CONTROL TECHNIQUES FOR PARTICULATE EMISSIONS FROM UNPAVED ROADS, AGRICULTURAL ACTIVITIES AND CONSTRUCTION. *Preprint, Air Pollution Control Association, Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-82.)*

Methods of controlling fugitive dust from unpaved roads, agricultural activities, and construction are presented. All controls are applications of one of three basic techniques, watering, chemical stabilization, or reduction of surface wind speed across exposed sources. Four methods of roadway treatment are used: paving, surface treatment with penetration chemicals, soil stabilization chemicals worked into the roadbed, and watering. Cost considerations are key factors in determining which techniques to use. Methods for control of fugitive dust from agricultural lands are basically the same as those for conservation of topsoils. Six general control methods are: continuous cropping, stubble or other crop residue or mulch left on field, limited irrigation of fallow fields, inter-row plantings of grain between widely-spaced row crops or strip cropping, vegetative or physical windbreaks, and spray-on chemical soil stabilizers. On construction sites, watering has a short effectiveness. Chemical stabilization is not successful in active construction conditions, but is effective after the site is completed. Methods are presented for stabilization of waste tailings to prevent air and water pollution, suppression of dust for storage piles, and dust control from cattle feedlots. Many of the methods described, particularly for agricultural sources, have a relatively low percentage control and may not be capable of achieving necessary reductions. If these individual measures are combined into an overall soil management program, they will have a synergistic, rather than a purely additive effect. While the costs for control are not unreasonable for a particulate source, the costs on a regional basis could easily exceed those for conventional stationary sources, especially for large agricultural areas. There is a need to begin to develop a program within the air pollution control agencies to control those sources of fugitive dust which have a significant impact upon the air quality within their jurisdiction.

44769 **APTIC NO. 65735**

Durych, Antoni and Andrzej Wiechowski

THE USE OF BUBBLING FLUID LAYER SCRUBBERS FOR CLEANING LOW- CONCENTRATION GASES. *(Zastosowanie pluczki z barbotazowym zlozem fluidalnym do oznaczania gazow o niewielkich stezeniach). Text in Polish. Gaz, Woda Tech. Sanit., (Warsaw), 48(2):60-61, 1974.*

A new method of interphase contact based on the triphasic bubbling fluid layer is presented. The technique of utilizing triphasic fluidization is a recent modern method of intensive gas and fluid contact in the presence of stable particles. These particles are in permanent movement induced by the gas thus breaking the gas bubbles. Thus, a characteristic mixture of gas, fluid, and particles is created, in which suitable conditions for mass exchange exist due to increased interphase surface. Since the layer is in constant movement, the triphasic fluidization uses both floating beds and turbulent contact absorbers (TCA). The scrubber described is a new and original method. The scrubber is made of a glass pipe with a 36 mm diameter and is 1.5 m high. The bottom of the pipe contains a filling consisting of 4 mm balls with a static layer height of 150 mm. Determination of low concentration gases by this method is characterized by simplicity, a short period of time, and does not require a separate analysis of the fluid in the scrubber.

44770 **APTIC NO. 65506**

Dyer, C. R. and J. D. Gibson

A SYSTEMS APPROACH TO ENERGY PLANNING: AN ALTERNATE FUEL DEMONSTRATION PROJECT. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th, Cost. Eff. Environ. Sci., Washington, D. C., 1974, p. 288-291. 3 refs. (April 28-May 1.)*

An alternate fuel demonstration project to demonstrate the technical and social practicability of using hydrogen as a primary fuel is discussed. The basis for such a project must include analyses of the social, political, economic, legal, and technological aspects of the problem. An interdisciplinary group was assembled to study the current energy situation. The team assembled relevant information on the energy problem and presented specific recommendations for satisfying national energy needs consistent with available resources. The results of the group's study are presented. The hydrogen fuel demonstration project proposes that two aircraft be modified and used to demonstrate the feasibility of using hydrogen as an aircraft fuel. The planes would fly a regularly scheduled triangular route from Alexandria, La. to Oklahoma City to San Bernadino, carrying military cargo and personnel. The project would take 5 years. Rough estimates predict a total expense for fuel and equipment in the neighborhood of $32 million. A total hydrogen economy would use hydrogen generated through electrolysis by nuclear, solar, and geothermal primary energy sources. The importance of the demonstration project is highlighted by the technological feedback to other energy users; the project would expedite the smooth transition from petroleum to alternate fuels at the earliest possible date. Short-term sacrifices will be necessary to fund research into undepletable and nonpollution nonfossil energy sources.

44771 **APTIC NO. 65260**

Eads, David K., Joseph M. Hildyard, and W. Bailey Barton

DESIGN ASPECTS OF ENVIRONMENTAL PROTECTION BY PREVENTION AND CONTROL OF EMERGENCY RELEASES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1974. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-132.)*

The design aspects of environmental protection by prevention and control of emergency releases are discussed. In modern industry, it is most desirable to use technology such that emergency conditions cannot develop under controllable circumstances, although it is appropriate to arrange matters so that any emergency transfer will occur under controlled conditions and thus prevent escape to the environment. In many cases, the objective becomes one of designing so that the maximum transient airborne concentration that can arise under emergency conditions is tolerable. For hazards that can result from airborne materials, useful information concerning down-wind concentration can be developed through the use of models, both mathematical and physical. Sophistication can range from a calculation of cloud dissipation under ideal conditions to extremely elaborate, very large computer/physical areas studied which would require the services of qualified meteorologists. (Author abstract modified)

44772 **APTIC NO. 68081**

Eatock, H. C., J. C. Plucinsky, and J. A. Saintsbury

DESIGNING SMALL GAS TURBINE ENGINES FOR LOW NOISE AND CLEAN EXHAUST. *J. Aircraft, 11(10):616-623, Oct. 1974. 8 refs. (Presented at the Canadian Aeronautics and Space Inst./American Inst. of Aeronautics and Astronautics Aeronautical Meeting, Montreal, Canada, Oct. 29-30, 1973, Paper 73-1154.)*

Preliminary results of design studies involving the use of small gas turbine engines to reduce noise and exhaust emissions from aircraft are reviewed. Comparisons of reciprocating engines with small turboprop engines indicate lower carbon monoxide and hydrocarbon emissions for the latter engine type at all power settings. The piston engines show somewhat lower nitrogen oxide production above 20% power, consistent with the fuel-rich operation of such engines. Small gas turbine engines have higher CO and unburned hydrocarbon emissions at low power and lower NOx levels at higher power than large gas turbines. The comparatively poor performance of the small engines at low power is due primarily to operation at low combustor pressure and temperature as well as to a high ratio of combustor surface area to volume and to the use of relatively simple and low-cost combustor and fuel systems. The good NOx performance at high power is due principally to lower levels of combustor inlet pressure and temperature. Early development data indicate that major reductions in CO and unburned hydrocarbons can be achieved with only small increases in NOx by means that do not imply appreciable changes in the size, weight, or complexity of the gas turbine engines.

44773 **APTIC NO. 68232**

Elmer, Thomas H. and Richard E. Tischer

POROUS GLASS SUPPORTS FOR AUTOMOTIVE EMISSIONS CONTROL CATALYSTS. *(Corning Glass Works, Corning, N. Y.) U. S. Pat. 3,804,647. 6p., April 16, 1974. 7 refs. (Appl. Dec. 15, 1971, 2 claims).*

A stabilized porous glass support material for noble metal and base metal catalysts is described. It is useful in the catalytic conversion of harmful automotive exhaust emissions. A process for preparing the support material and methods for using it in automotive pollution control systems are also described. The porous 96% silica glasses are suitable support materials for base and noble metal catalytic coatings from the standpoint of surface area and porosity and act as a scavenger for trace metallic ion impurities in exhaust fumes to prevent poisoning of the catalyst. Early attempts to use porous glasses as substrate materials for catalysts were only partially successful because of the marginal thermal stability of the glass as a support material caused by the migration of the boron in such glasses to the surface of the material on heating and the subsequent blocking of active sites on the catalyst by the liberated boron causing catalytic poisoning. The present invention provides novel methods for employing a stabilized porous 96% silica glass in which the surface boron is extracted. The present invention provides the required surface area, porosity, and thermal stability for automotive catalytic systems.

44774 **APTIC NO. 65251**

Ettinger, Harry J., Marvin I. Tillery, John C. Elder, and Manuel Gonzales

AEROSOL RESEARCH AT THE LOS ALAMOS SCIENTIFIC LABORATORY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1974. 11 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-118.)*

Current research centering on air pollution control at the Los Alamos Scientific Laboratory is discussed. It includes studies to define the performance of multiple high efficiency filters against plutonium oxide aerosols and theoretical calculations evaluating industrial air cleaner performance in terms of total mass collection, potential for particulate inhalation and lung deposition, estimation of visibility degradation, and production of condensation nuclei. Filter testing required the development of plutonium oxide aerosols with aerodynamic size characteristics comparable to those produced under a variety of actual production and research conditions. This involves development of milling and aerosol generation techniques to control particle size and minimize production of particle agglomeration. Experimental data using these sub-micron aerosols confirm that successive filter stages perform at or above minimum acceptable efficiencies. Performance characteristics were calculated for different industrial air cleaners as a function of aerosol size in terms of total mass, respirable mass, visibility degradation, and number concentration. (Author abstract modified)

44775 **APTIC NO. 65512**

Fauth, Mae I.

NON-POLLUTING METHODS FOR DISPOSAL OF ORDNANCE AND OTHER HAZARDOUS MATERIALS. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th, Cost. Eff. Environ. Sci., Washington, D. C., 1974, p. 504-507. (April 28-May 1.)*

In order to find nonpolluting methods for the disposal of ordnance, solid propellants, and other hazardous materials, a number of methods were examined. These methods include: separation and reclamation of ingredients for possible reuse, biodegradation, fluidized bed incineration, rotary kiln incineration, molten salt process, rocket combustion, and wet-air oxidation. These methods are described, and cost-benefit data are presented. A comparison of the expected amounts of carbon monoxide, hydrocarbons, oxides of nitrogen, hydrogen chloride, and particulates from the disposal processes is given. While the destruction of propellant and other hazardous materials by controlled oxidation in a closed system represents a great improvement over the open burning previously practiced, the long- range goal of such a program should be the reclamation and reuse of expensive and critical ingredients and the utilization of the energy produced by the oxidation of those materials for the complete destruction is necessary. (Author abstract modified)

44776 **APTIC NO. 65263**

First, Melvin W. and William C. Hinds

HIGH EFFICIENCY REMOVAL OF SUBMICRON PARTICLES BY ULTRA-HIGH VELOCITY AEROSOL FILTRATION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 38p., 1974. 19 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-139.)*

The high efficiency removal of submicron particles by ultra-high velocity aerosol filtration was investigated. Collection efficiency of fibrous filters for submicron aerosol particles decreases as face velocity increases above the customary range of 5-30 fpm. For velocities greatly in excess of a few hundred ft/min, collection efficiency increases spectacularly and soon attains values in excess of 99% for 0.7 micron dioctyl phthalate (DOP). These high efficiencies persist to 3500 fpm. Energy requirements increase to levels comparable to those needed for successful operation of high energy scrubbers. The advantages of ultra-high velocity include: compactness of equipment with opportunities for significant reductions in acquisition and installation costs; collection efficiency high enough to meet modern emission control regulations; a dry collection method that requires no water supply or disposal facility. Commercial applications of high velocity filtration to cooled plastic during oven fumes were effective in eliminating the characteristic white plume caused by condensing plasticizer. (Author abstract modified)

44777 **APTIC NO. 68237**

Fox, Rolan H.

AIR POLLUTION CONTROL UNIT FOR INTERNAL COMBUSTION ENGINES. *(Assignee not given.) U. S. Pat. 3,802,191. 5p., April 9, 1974. 4 refs. (Appl. Sept. 20, 1971, 6 claims).*

An air pollution control device for connection between the exhaust manifold and exhaust outlet of automobile internal combustion engines is designed to reduce exhaust emissions without requiring the use of chemicals or moving parts. The device does not require the redesign of engines or the use of nonconventional fuel. The apparatus consists of an exhaust gas chamber, two vacuum separator tanks, and a third tank, all connected together by tubes. The exhaust gas chamber which contains several sheet metal cones in equal and parallel spaced relation to each other is connected to the engine exhaust manifold. Two vacuum separator tanks are connected to the exhaust gas chamber by respective tube, with one of the tanks having a tube which is connected to the engine intake manifold. The other vacuum tank is connected to the engine air cleaner. The two vacuum separator tanks are connected to a third tank which has a water drain tube in its bottom and is provided with a sponge filter to trap solids that enter it.

44778 **APTIC NO. 68236**

Frank, Daniel L.

SOLENOID VALVE CONTROL FOR EXHAUST GAS RECIRCULATION. *(General Motors Corp., Detroit, Mich.) U. S. Pat. 3,799,133. 4p., March 26, 1974. 3 refs. (Appl. June 22, 1972, 2 claims).*

A solenoid control valve for use in exhaust gas recirculation systems designed to minimize nitrogen oxide emissions from internal combustion engines is designed to open and close each engine cycle with the opening time being in accordance with engine operation conditions as opposed to conventional systems in which the valve gradually opens and closes in response to a selected engine condition. The solenoid valve in the exhaust gas recirculation passage is controlled by an electrical circuit so as to be energized to the open position in accordance with engine speed, with a means being included for varying the energization time in response to manifold pressure. The circuit includes an amplifier for energizing and deenergizing the solenoid during each engine cycle, a pressure transducer positioned at the intake passage downstream of the throttle for responding to absolute pressure at the intake passage, and a means for responding to the transducer and for controlling the amplifier energization.

44779 **APTIC NO. 65169**

Fremery, Max, Hermann Hoever, and Gert Schwarzlose

ELECTROCHEMICAL BENZENE-OXIDATION, A METHOD FOR PRODUCING HYDROQUINONE WITHOUT BY-PRODUCTS. *(Elektrochemische Benzol-Oxidation, ein nebenproduktfreier Weg zum Hydrochinon). Text in German. Chem.-Ing.-Tech., 46(15):635-639, 1974.*

Electrochemical production of hydroquinone was tested uninterruptedly for 4000 hr in an experimental plant by anodic oxidation of benzene and cathodic reduction of quinone. The method uses the favorable dissolving conditions for quinone in benzene and for hydroquinone in aqueous sulfuric acid as electrolyte. The optimum space/time efficiency with regard to the cell was set for 40%. Complete electrolyte purification is achieved at the same time. An electrolyte flow branched off from the cathode circuit by way of a cathodic post-reaction yields hydroquinone crystals, which after a scrubbing process are entirely pure. All process flows can be entirely recycled, so that hydroquinone production is entirely without environmental pollution. An important part of the process is the benzne recovery by a reversible thermal scrubbing-oil absorption cycle. Benzene from cathode and anode waste gas is absorbed in two scrubbers and desorbed again at 200 C. After condensation, benzene is returned to the cycle. Benzene traces in the waste gas are removed by adsorption from the catholyte hydrogen and by catalysis from the anode waste gas.

44780 **APTIC NO. 65422**

Furlong, L. E., E. L. Holt, and L. S. Bernstein

EMISSION CONTROL AND FUEL ECONOMY. *Preprint, American Chemical Society, Washington, D. C., 11p., 1974. 13 refs. (Presented at the American Chemical Society Meeting, Los Angeles, Calif., April 1, 1974.)*

Factors affecting emission control and their relationship to fuel economy in motor vehicles are discussed. High exhaust gas temperatures are desirable for the control of emissions outside of the engine. There are three basic methods for emission control: thermal reactors, which rely on homogeneous oxidation to control carbon monoxide and hydrocarbons; oxidation catalysts; and dual catalyst systems, which incorporate in series a reduction catalyst for nitrogen oxides and an oxidation catalyst for CO and hydrocarbons. When NOx control is needed with the first two methods, exhaust gas recirculation may be added to the system. For meeting the 1975 U. S. interim standards, the combination of thermal systems and high compression ratios (with leaded fuels) is almost equivalent to the use of catalystic systems, at lower compression ratios. For more stringent standards, the catalytic systems are more efficient. If catalytic systems are used widely, there is a fuel economy incentive for increasing vehicle compression ratios and using higher octane unleaded fuels. (Author summary modified)

44781 **APTIC NO. 65448**

Gapinska, Teresa and Aleksandra Dziewanowska-Pudliszak

NEW TYPE OF INDUSTRIAL VANADIUM CATALYST FOR THE OXIDATION OF SO2. *(Nowy typ przemyslowego katalizatora wanadowego do utleniania SO2). Text in Polish. Przemysl Chem., 53(1):30-33, Jan. 1974. 11 refs.*

An active vanadium catalyst in the form of rings was constructed for the oxidation of sulfur dioxide. It is characterized by surface resistances twice as low when compared to universally used forms in the shape of full cylinders. The new catalyst was tested under conditions of model shelf and industrial contacting apparatus. The research results were compared to the calculation results based on a method worked out earlier of planning the oxidation process of sulfur dioxide to sulfur trioxide. The mechanical resistance was determined on the basis of measurements of friction, microhardness, and resistance to pressure. Dynamic resistance of the stratum of rings and cylinders was measured on a large scale model shelf. The resistance of the 50 cm catalyst stratum during oxidation of SO2 to SO3 was measured by means of a differential manometer. The activeness of the rings K 8/3 and of the full cylinders K 4, K 6, and K 8 were tested. The activeness of the rings was similar to the activeness of the full cylinders with a 6 mm diameter, a little higher than 8 mm cylinders activeness, and somewhat lower than the activeness of the 4 mm cylinders. The resistivity of the ring catalyst to friction and pressure is equal to the resistivity of the full cylinder catalyst. The rings can be by 19% lighter in weight than the full cylinder catalyst. Replacement of cylinders with rings will lead to reduction of total mass of industrial installation.

44782 **APTIC NO. 65499**

Glaser, Peter E.

THE SOLAR POWER OPTIONS. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th, Symp. Sol. Energy Util., Washington, D. C., 1974, p. 75-87. 5 refs. (April 30.)*

The potential of solar power is discussed against the background of future needs. Large-scale conversion of solar energy to power based on the use of wind, ocean thermal gradients, solar-powered heat engines, and photovoltaic energy conversion on Earth and in space are discussed. The historical development of these approaches and the state-of-the-art of components and systems are reviewed to provide a basis for projecting their potential. Cost projections on specific approaches are provided to the extent that they are available. The U. S. intercepts 500 times the energy requirements projected for the year 2000 if all the energy could be converted for useful purposes. Potential solar energy use will lead to increased availability of energy without undesirable environmental consequences. (Author abstract modified)

44783 **APTIC NO. 65590**

Goldfield, Joseph

FABRIC FILTERS IN ASBESTOS MINING AND ASBESTOS MANUFACTURING. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 30p., 1974. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-275.)*

The largest fabric filters in the world, used as means of controlling the emission of dust from various processes both within mines and manufacturing plants and to the outdoors, are described. A bag-collector is installed under negative pressure without any partitions around the compartments under negative pressure with the shaking dampers on the dirty air side of the collector. The systems operate at a very low pressure drop. Six inches of negative pressure in the dirty air plenums gives greater than design flows in practically all systems of the mill. The pressure difference between the dirty air plenums and the twelfth floor is only a few tenths of an inch higher than the cloth bags themselves. The installation has been remarkably free of problems. The chief maintenance requirement has been to change bags after six to seven years. Every one of the manufacturing plants using asbestos in the process has one or more fabric filters. The efficiency of the filters is very high. Due to the necessity of monitoring the dust leaving fabric filters in the asbestos industry, there is a great need for a moderate price continuously operating monitor that is sensitive enough to read the extremely low concentrations of effluent of a well operating machine. Costs of fabric filter systems are discussed.

44784 **APTIC NO. 68235**

Griese, Wolfgang

COMBUSTION ENGINE WITH QUICK ARRANGEMENT FOR ITS EXHAUST GAS CLEANING DEVICE DURING COLD OR IDLE RUN. *(Volkswagenwerk Aktiengesellschaft, Wolfsburg (West Germany)) U. S. Pat. 3,799,134. 6p., March 26, 1974. 2 refs. (Appl. Dec. 11, 1972, 7 claims).*

An arrangement for adjusting the fuel supply and the timing of an internal combustion engine during its idle run as a function of the temperature in order to attain the production of exhaust gases having sufficient temperature in turn for heating an exhaust gas cleaning device to its required operating temperature is described. A pair of switching means are placed in a series electrical circuit with respect to each other and also in a series circuit with a pair of parallel connected magnetic valves. One of the magnetic valves after being energized opens a bypass air channel bypassing the choke or butterfly valve, while the other magnetic valve opens a low pressure channel branching off from the main suction pipe of the engine and leading to the distributor in order to delay the ignition timing. One of the switching means is operable by a thermostat which in the cold state keeps the associated switching means closed, while the other switching means is operable by a cam arranged on the shaft of the butterfly valve for keeping the associated switching means closed in the idle run position of the choke valve. (Author summary modified)

44785 **APTIC NO. 68059**

Hamilton, J. M.

A REVIEW OF AUSTRALIAN VEHICLE EMISSION CONTROLS AND THEIR ACHIEVEMENT. *SAE - Australasia, p. 130-140, July-Aug. 1974. (Presented at the Society of Automotive Engineers of Australia, National Convention, 2nd, Nov. 1973, Paper 24.)*

Current and projected pollution controls for vehicles in Australia are reviewed. The Australian Transport Advisory Council initially sought controls for crankcase emissions which resulted in vehicles being equipped with Positive Crankcase Ventilation valves. Carbon monoxide emissions from a vehicle at idle were limited to 4.5% by volume. This was achieved by controlling the air-fuel mixture ratio at the carburetor. The control of hydrocarbons and CO from the exhausts during normal driving is based on vehicle operation over a prescribed driving cycle on a chassis dynanometer. Cars manufactured after Jan. 1, 1975, must have special fittings to reduce fuel evaporative losses from the fuel system. After July 1976, all new cars must be fitted so as to reduce CO, hydrocarbons, and nitrogen oxides to levels in line with United States 1973 Rule. Other proposed air pollution control measures are improved traffic flow, staggered working hours, restrictions on vehicles in central business districts, increased use of public transportation, and industrial pollution controls.

44786 **APTIC NO. 68136**

Heeney, John M.

GAS SCRUBBER, ENTRAINMENT SEPARATOR AND COMBINATION THEREOF. *(Fuller Co., Catasauqua, Pa.) U. S. Pat. 3,798,883. 12p., March 26, 1974. 7 refs. (Appl. Aug. 27, 1970, 6 claims).*

A gas scrubber which can be used with an entrainment separator in a combination arrangement for the removal of particulate and gaseous components from a gas stream is designed for the removal of such contaminants over a wider size range than prior art devices. The scrubber consists of a gas-conducting conduit with a portion having an inner surface that diverges in the direction of gas flow, a diverter that is disposed in this portion of the conduit and that has an opposed diverging surface with a greater degree of divergence, and a pipe that feeds scrubbing liquid to that surface of the diverter. The diverter is preferably supported from above and is resiliently urged in an upward direction so that it is automatically moved by a change in the gas flow rate. The scrubber provides an annular flow of gas that is changed to a helical downward flow by the specific entrainment separator, situated below the diverter and having helically extending elongated plates in a vertical conduit within a chamber. A frustoconical diverter is disposed below the bottom open end of the vertical conduit to change the direction of the gas leaving the conduit. Another conduit communicates tangentially with a sidewall opening of the chamber adjacent its top to exhaust the gas from the annulus between the chamber and the vertical conduit. Accumulated liquid is removed from the bottom of the chamber.

44787 **APTIC NO. 65588**

Hemsath, Kalus H., Arvind C. Thekdi, and Frank J. Vereecke

POLLUTION CONTROL WITH ENERGY RECOVERY IN COATING INDUSTRY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 26p., 1974. 4 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-273.)*

A coating process is adapted to eliminate the air pollution problem and recover the thermal energy of the solvents, using oxygen-free inert gases in the oven. Solvent-based coatings such as paints and organic films emit solvent vapors during drying operations which are highly flammable. Only a few years ago, the air-vapor mixture from the drying oven was discharged into the atmosphere. Air pollution regulations now require that the fumes from such ovens should be treated to reduce the hydrocarbon level of the fumes before discharging them into the environment. Many industries have installed thermal incinerators to clean the fumes. The use of such incinerators has doubled or tripled the process fuel consumption, and with the present energy shortage, it is often impossible to meet such energy demands. In the new process, the solvent-laden inert gases or fumes are incinerated in a specially-designed incinerator. The incinerator acts as a burner on an inert gas generator. The incinerator exhaust gases are essentially oxygen-free. The heat from incinerating the solvent vapors is often sufficient to provide all of the required process heat and the clean combustion products can be recirculated to the oven. The performance comparison of the new process and the conventional process shows that in a typical case the fuel consumption can be reduced by 90 to 95% while simultaneously eliminating the air pollution problem.

44788 **APTIC NO. 65648**

Hill, Robert W.

DUST CONTROL WITH COLLECTORS ON CONTINUOUS MINERS. *Mining Congr. J., 60(7):46-53, July 1974. 5 refs.*

A dust control system for coal mining was designed consisting of a Gundlach Model 26 SBR scrubber mounted on a 10-CM continuous miner with the intake face ventilation supplied by blower tubing to eliminate delays caused by the use of exhaust tubing to control respirable dust. The scrubbers were tested at Inland Steel Co. in Jan. 1971. When the effects of rotor speed to efficiency were determined, the following efficiencies were found based on the mass removal of particles from 0.68-8.64 micron collected a personal sampler: 1600 rpm - 76%, 2000 rpm - 87.1%, and 2500 rpm - 92.8%. The scrubber s performance on 3.3-3.7 mg/cu m dust concentration for an 8-hour shift producing 550 tons of coal was determined with the following controlled operating parameters: 2000 rpm rotary speed, 50% effective continuous miner water spray system, scrubber capacity of 6400 cu ft/min, 3000 cu ft/min discharged at 500 ft/min blower tubing discharge velocity, and scrubber discharge ratio to blower tubing discharge of 2.1 at 6400 cu ft/min. The miner spray efficiency was the most important parameter determining scrubber efficiency. A full cone spray pattern was the most effective design of the spray nozzles. In an experiment after improvement of the system with respirable dust concentrations averaging 2.3 mg/cu m for an 8-hour shift producing 460 tons of coal, operating parameters were: 1400 rpm, 70% scrubber dust removal efficiency, continuous miner water spray system was 75% efficient, scrubber inlet located on the bottom of the cutter boom and discharge was located at the left rear of the miner, scrubber capacity was 3000 cu ft/min, the velocity of the blower tubing discharge was 150 ft/min in the dust cloud area, and the ratio scrubber discharge to blower tubing discharge was zero because the system was balanced. A controlled circulation of the air was also tested.

44789 **APTIC NO. 65264**

Hishinuma, Y., N. Arashi, Z. Tamura, and T. Narita

WET ACTIVATED CARBON PROCESS FOR SO2 REMOVAL. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 28p., 1974. 3 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-140.)*

A wet activated carbon process for the removal of sulfur dioxide formed during the production of commercial electrical power is described and evaluated. In the new desulfurizing method, the slurry which washes the flue gas consists of activated carbon and dilute acid sulfuric acid. The SO2 which is absorbed in the dilute acid is converted to H2S04 and produces dilute H2S04 as a by-product. No by-product oxidation process and no absorbent regenerating process are necessary. Performance was measured in a 3000 N cu m/hr pilot plant. There is sufficient flexibility for a wide range of SO2 removal (95% removal rate of SO2) if the optimum values for gas ratio, liquid ratio, and height of bed of fillings were selected. Concentration equipment was developed to recover the by-product that used the heat of the flue gas to heat the dilute H2S04 by direct heat exchange. Synthesizing equipment was developed for gypsum. The block gypsum is handled easily, is not blown away by wind, and there is no waste liquid discharged from the synthesizing equipment. (Author abstract modified)

44790 **APTIC NO. 65746**

Inaba, Hideya

HITACHI SHIPBUILDING S METHOD OF ELIMINATING NITROGEN OXIDES IN EXHAUST GAS. *(Hitachi zosen-shiki haien dassho ho). Text in Japanese. Sekiyu Gakkaishi (J. Japan Petroleum Inst.) (Tokyo), 17(6):512-515, June 1974.*

Methane, hydrogen, and carbon monoxide are generally used as reducing agents with platinum and palladium as the catalysts in non-selective contact reduction of nitrogen oxides in stack gases. Nickle, nickle oxides, and copper-zinc-chromium can be used as catalysts. Most of these catalysts, however, undergo a change by sulfur oxides, and these catalysts are not used for treating exhaust gas produced from the combustion of heavy oil. An effort to industrialize a method of simultaneously reducing sulfur dioxide and nitrogen oxides in which carbon monoxide is used as a reducing agent and copper or silver are used as catalysts is described. The catalyst, however, changes into a different substance when water and oxygen are present. A two-stage method consisting of desulfurization and an elimination process for nitrogen oxides using a new catalyst was adopted. The results obtained from a test conducted by establishing a pilot plant capable of treating 10,000 N cu m/hr of exhaust gas are presented. A typical catalyst is used in the non-selective contact reduction and remains intact without showing a decrease of efficiency even after 3000-hour continuous operation. Another catalyst also belonging to the non-selective type was tested, and has the same efficiency as the first catalyst, though it has different elements and is manufactured differently. A half-selective catalyst was developed which does not react with sulfur oxides and its reacting curve with oxygen is almost the same as that with nitrogen monoxide. A selective contact reduction method was studied to solve the defect of conventional selective catalysts and another new catalyst was developed. A pilot plant operation for selective contact reduction using ammonia as the reducing agent is described. The reacting temperature is in the range of 380 to 420 C and the ratio of ammonia used in the operation to its theoretical value is 1.5 to 2.4.

44791 **APTIC NO. 64984**

Inculet, I. I.

INDUSTRIAL APPLICATIONS OF STATIC ELECTRICITY. *Dechema Monograph, 72(1370-1409):163-181, 1974.*

The three electrification processes (corona charging, contact electrification (tribo- and field induced), and polarization in electric fields) are reviewed. The various industrial applications are classified according to the process used and typical examples are presented in some detail. These include single and two-stage electrostatic precipitators (corona charging) and fluidized bed electrostatic separators (contact electrification). Excellent results have been obtained for the oxidation of methyl mercaptan, toluene, and sulfur dioxide in a negative corona current.

44792 **APTIC NO. 64971**

Ishiguro, Tatsukichi

FROM THE REPORT OF AN OBSERVATION TEAM FOR BAD ODOR POLLUTION IN EUROPE(II). *(Oshu akushu kogai kansatsu kenshudan no hokokusho kara(II)). Text in Japanese. Akushu no Kenkyu (Odor Research J. Japan), 3(15):48-57, June 1974.*

Most of the rendering plants in Denmark treat about 100 tons of material a day. In 1969, 92% of the materials came from slaughterhouses and 8% as animal cadavers. At one plant at Spanek, deodorization is done by using tablet contact absorber using a hollow synthetic resin and oxidation by chlorine. At Alfa Laval in Switzerland, exhaust gas from the cooker is passed through a cyclone to a spirical-type heat exchanger. The uncondensed gas is again passed through the heat exchanger and then through a polypropylene duct to a chamber where deodorization is completed by oxidation with chlorine dioxide (ClO2). At Hautzentrale and Fettschmelze Co (HFZ) in Switzerland, deodorization is carried out with a two-stage gas washing apparatus. Gas is introduced into the first stage where it is absorbed by an aqueous ClO2 solution and the resulting gas is then led to the second stage where it is further washed. The chlorine dioxide is prepared from chlorine and chloride.

44793 **APTIC NO. 68062**

Ishihara, Tadashi

NOX TREATMENT BY THE COMBUSTION IN BOILERS. *(Boiler nensho-ji no NOx taisaku). Text in Japanese. Boira Gishi (Boilermen), 29(3):193-205, March 1974.*

The mechanism of formation of nitrogen oxides by combustion, methods to suppress the formation of NOx, and the practice of the suppression are discussed. Two origins are known for the NOx discharged from boilers. One is the NOx formed by the reaction of nitrogen in air with oxygen at the high temperature of combustion. The other is the NOx formed by the combustion of fuel that contains nitrogen compounds. The concentration of NOx in the discharged gas is dependent upon the temperature of combustion, the concentration of oxygen at the range of combustion, and the reaction time in the high temperature region. Lowering of the combustion temperature, agitation of the flame, and shortening of the combustion time are the most effective methods to reduce NOx content. However, all of these are related to the efficiency of boilers. From the practical viewpoint, the improvement of the structure of burners, lowering of the supplied air, reduction of the heat output of the combustion chamber, 2-step combustion, recirculation of discharged gas with the air, and admixture of water or steam are important control methods.

44794 **APTIC NO. 68238**

Ivessa, Stefan

WASTE GAS FLOW SYSTEM FOR METAL-TREATING APPARATUS. *(Waagner-Biro Aktiengesellschaft, Vienna (Austria)) U. S. Pat. 3,797,812. 7p., March 19, 1974. 1 ref. (Appl. Sept. 6, 1972, 16 claims).*

A waste gas flow system for metal refining converters is described which utilizes a ring assembly that avoids slag and scale formation and prevents escape of carbon monoxide converter gas to the atmosphere. The system consists of a converter vessel and a waste gas conduit aligned with but spaced from the discharge end of the vessel. An annular means surrounds the waste-gas conduit at its end region which is adjacent to the vessel, with the annular means defining a chamber in which a ring assembly is located in an upper open position. The ring is shiftable to a lower closed position, engaging the top end of the vessel and extending between the vessel and the waste-gas conduit for closing the space between the vessel top and the waste-gas conduit. The ring assembly in the closed position has an upper end region which extends into a chamber above; the upper end region defines with the waste-gas conduit and with an outer wall of the chamber a pair of gaps through which any waste gas which seeks to escape must flow while changing its direction at least twice.

44795 **APTIC NO. 65561**

Jashnani, I. L. and S. Calvert

WET SCRUBBER ENTRAINMENT SEPARATORS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 31p., 1974. 11 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-230.)*

The present technology related to wet scrubber entrainment separation is evaluated. This includes searching the literature, contacting the manufacturers of wet scrubber entrainment separators, evaluating existing theoretical models, and reviewing materials on clogging and caking in sulfur oxides scrubbing systems. Theoretical models to predict primary collection efficiency and the pressure drop in the baffle-type entrainment separator were developed. The primary collection efficiency equation is based on turbulent mixing. The pressure drop equation is based on drag forces exerted by the baffles. A general relationship between equations to predict primary collection efficiency with and without assumption of turbulent mixing is derived. The effect of gas velocity on renentrainment is determined. Theoretical models to predict reentrainment in the cyclone and in the vertical and horizontal baffle type separators are developed. This, coupled with primary collection efficiency, determines overall performance of the entrainment separator. A 3000 cfm capacity pilot plant to study wet scrubber entrainment separation was designed and constructed. The aim of the entrainment is: to check presently available design equations for entrainment separators (efficiency of separation and pressure drop); to measure the effect of higher velocity (reentrainment bouncing of drops, and impaction mechanism); to measure liquid drainage and flooding; and to investigate problems associated with entrainment separation. Five types of commonly used entrainment separators are studied, namely cyclone, baffle type, packed bed, mesh, and the bundle of struts. Data are evaluated to confirm the theoretical work. (Author summary)

44796 **APTIC NO. 65501**

Juang, J.-N., R. S. Becker, and John Peddieson, Jr.

NUMERICAL SIMULATION OF ONE-DIMENSIONAL MULTIPHASE FLOWS. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th, Cost. Eff. Environ. Sci., Washington, D. C., 1974, p. 229-232. 6 refs. (April 28-May 1.)*

A mechanical theory of multi-phase one-dimensional flow is discussed. It is applied to an idealized model of a venturi scrubber. When appropriate approximations are made, the theory reduces to that previously given by Calvert. The theory is also applied to two-phase jet flows. Both analytical and numerical solutions are presented for the purpose of illustrating various interesting features of such flow. Two-phase flows have several applications in environmental engineering such as gas-solid particle jets in impingement dust collectors and liquid-gas bubble jets in processes such as aeration of jet water in thermal effluent plumes to enhance mixing and aeration of activated sludge both to promote mixing and to provide oxygen for the microorganisms which break down organic materials. (Author conclusions modified)

44797 **APTIC NO. 64980**

Kaiser, Erwin

THE OXIDES OF NITROGEN EMISSION AT THE COMBUSTION OF NATURAL GASES WITH A HIGH FRACTION OF NITROGEN IN A GAS TURBINE. *(Zur NOx- Emission bei der Verbrennung non Erdgasen mit hohem Stickstoffanteil in einer Gasturbine). Text in German. Energietechnik, 24(7):298-300, July 1974. 4 refs.*

Through the conversion of power plants to natural gas, the dust and sulfur dioxide emission in industrial centers of the German Democratic Republic could be reduced. The natural gas stems from the Soviet Union and has a methane content of less than 50%. Combustion of this gas in steam boilers also reduced the oxides of nitrogen emission as compared to oil and soft coal-fired plants. Emission measurements for natural gas with 35% CH4 in N2 revealed that the high N2 fraction has the same effect as the addition of inert substances (waste gas, water steam) to thermally valuable fuels. The NOx emission is not increased through the high N2 concentration. In fact it is not higher than at combustion with low-nitrogen natural gas. The carbon monoxide emission is four to five times higher.

44798 **APTIC NO. 65640**

Kanematsu, Sadao

COUNTERMEASURES FOR PREVENTING AIR POLLUTION CAUSED BY GLASS INDUSTRY. *(Garasu kogyo ni okeru taiki osen boshi taiseaku). Text in Japanese. Seramikkusu (Ceramics), 9(1):15-21, 1974.*

Emission standards for general glass industries are: 1.0 mg/N cu m for cadmium and its compounds, 10 mg/N cu m for fluorides, and 20 mg/N cu m for lead and its compounds. The standards are much more stringent in Kaganaga prefecture, and are 0.5, 2.5 and 10, respectively. Emission standards for soot and dusts for glass industries are also stricter in Kanagawa prefecture than in other prefectures. Various control measures for air pollutants emitted by glass industries are discussed. For controlling sulfur oxides, the use of low sulfur fuels, high stacks, stack gas desulfurization systems are successfully employed. For dusts and soot, electrostatic precipitators and filters can keep the emission concentrations to less than 0.05 g/N cu m. For toxic substances, more than 98% of lead and cadmium compounds can be eliminated by specially designed electrostatic precipitators. Fluorine, hydrogen fluoride, and silica fluoride are absorbed by powder absorbents such as slake lime and alumina, and filtered by glass fiber bag filter. The elimination rate exceeds 99.5%. The wet method of absorption utilizes caustic soda solution as absorbent. The process includes gas cooling, gas scrubbing and liquid waste treatment. The efficiency is more than 97% and the rate of dust collection is more than 75%. Fluorides in the stack gas are less than 1 mg/N cu m and soot is less than 0.05 g/N cu m. The emission standards for nitrogen oxides are expected to be set in 1974. Denitrization in glass industries is problematical. Glass melting furnaces cannot adopt systems such as flue gas recirculation or two-stage combustion. The only method presently being studied is an improvement in combustion methods. Unanswered questions include the acceleration of denitrization reaction speed, elimination of interfering substances in the gas, and the use and treatment method for by-products.

44799 **APTIC NO. 68239**

Kato, Takashi, Isao Takahashi, Kojiro Wakamatsu, and Yashuhiko Shimizu

AIR PURIFIER. *(Shimizu Kensetsu Kabushiki Kaisha (Japan) and Toyo Kuki Chowa Kabushiki Kaisha, Tokyo (Japan)) U. S. Pat. 3,804,942. 7p., April 16, 1974. 9 refs. (Appl. Nov. 16, 1971, 10 claims).*

An air purifier is described which includes a structure for eliminating various forms of dust, fumes, mist, microbes, gas, and odor from polluted air by passing the polluted air through a succession of different filters arranged within a casing. A prefilter removes coarse dust and an electrostatic dust collector removes fine dust; thus, all the pollutants from viruses to coarse dust are physically eliminated, leaving only harmful chemical gases. An ion-exchange resin filter or an oxidation catalyst filter change the remaining gases into stable salts or into a firm easily adsorbable on active carbon. Activated carbon may be used as the final filter. Conventional air purifiers used only one or two types of collectors or filters, and thus were unable to collect all types of pollutants. Thus, the present invention is an improvement. (Author abstract modified)

44800 **APTIC NO. 68075**

Kawakita, Shirou and Niichi Hayashi

REDUCTION OF NOX IN AUTOMOTIVE EXHAUST GAS (I). *(Jidosha haiki gasu no chisso sanka butsu (NOx) kaishu ni kansuru kenkyu (I)). Text in Japanese. Aichi Kogyo Daigaku Kenkyu Hokoku (Bull. Aichi Inst. Technol.), no. 9:83-85, March 1974.*

The possibility of reducing nitrogen oxides in automotive exhaust gas by reacting with the hydroxyl group of sodium hydroxide was experimentally studied. The NOx in automotive exhaust gas is 90% nitric oxide which is converted to nitrogen dioxide by secondary injection of air, cooled to 100 C, and passed through aqueous NaOH solution. The revolutional frequency of the engine was varied in the range of 500- 3500 rpm, the ratios of exhaust gas and secondary air injected were 7/10, 5/10, 3/10 and 0, and NaOH concentrations were 0, 2, 4 and 8%. The reduction rates in NOx were 59.8% and 12.0% at 1000 rpm and 39.9% and 9.0% at 1500 rpm in the case of 2% and 8% NaOH solution, respectively.

44801 **APTIC NO. 65581**

Kaye, Neil A. and Mark R. Newberger

NO NOX.....BUT HOW? - AN INDUSTRIAL CASE HISTORY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1974. 5 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-260.)*

The results of Cyanamid s efforts to reduce process generated nitrogen oxides emissions in a gas stream containing excess oxygen are described. The Los Angeles Air Pollution Control District would not issue construction permits until a satisfactory scheme for NOx removal had been found, even though regulations governing this type of emission were nonexistent. Systems for NOx abatement from nitric acid plant operations have been discussed extensively in the literature and found impractical in this application. A number of alternate systems are discussed, including the kinetic aspects. Data from the system of choice, two-stage incineration based on an actual source test, met the most stringent of any existing regulations. Increasing the steam flow to the burner increases NOx emissions while decreasing primary and secondary zone temperatures and percent combustibles. Operation of the unit at minimum steam flow, while maintaining the highest allowable primary zone temperatures, gives lowest NOx levels. Increased natural gas flows decrease the NOx levels while increasing the incinerator temperatures and percent combustibles. Secondary recombination and formation 100%. Increased process gas flow increases nitric oxide emissions resulting from the increased incinerator temperatures associated with increased steam and natural gas demand to maintain primary gas temperatures below maximum and maintain an excess of natural gas. For any given set of process gas, steam and natural gas usage conditions increasing the NOx inlet concentrations caused small increases in outlet concentrations.

44802 **APTIC NO. 65562**

Keairns, Dale L., Eoin P. O'Neill, David H. Archer

SULFUR EMISSION CONTROL WITH LIMESTONE/DOLOMITE IN ADVANCED FOSSIL FUEL PROCESSING SYSTEMS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 26p., 1974. 20 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-233.)*

A process of high temperature sulfur removal achieved with limestone and/or dolomite in fluidized bed fuel processing now being developed for power generation is described. Westinghouse is developing this process for low Btu gasification and fluidized bed combustion of fossil fuels. The use of limestone/dolomite for high temperature emission controls offers the opportunity to meet sulfur dioxide emission standards; to minimize the environmental impact of spent solids; and to permit greater simplicity, versatility, efficiency, and reduced electrical energy costs over competitive processes. Alternative sulfur removal system concepts have been experimentally studied for each fuel processing system: once-through and regenerative sorbent operation, pressurized and atmospheric pressure operation, spent stone processing, and disposal/utilization of processed stone. A thermogravimetric analysis system, capable of operating at elevated pressure with corrosive gases, is being used to collect kinetic data over a wide range of operating conditions- e.g., stone type, temperature, pressure, particle size, and gas composition. Illustrative data on sulfur removal and regeneration which are being used for establishing design and operating conditions are presented for each fuel processing system. (Author abstract modified)

44803 **APTIC NO. 68135**

Klaue, Hans J. and Josef Reisacher

PROCESS FOR DETOXICATING EXHAUST GASES FROM OTTO-COMBUSTION ENGINES AND APPARATUS FOR CARRYING OUT SUCH PROCESS. *(Aktiengesellschaft Kuhnle, Kapp and Kausch, Frankenthal (West Germany)) U. S. Pat. 3,796,046. 7p., March 12, 1974. 6 refs. (Appl. April 30, 1971, 3 claims).*

An afterburning process for reducing motor vehicle emissions of carbon monoxide and hydrocarbons is described which precludes extensive equipment for feeding the required air into the exhaust gases by means of exhaust gas expansion so that combustion air is sucked in by a partial vacuum formed. A twist generator is used to impart a swirl to the exhaust gases, resulting in their expansion. Air is aspirated into the expanded exhaust gases to provide a combustible gas-air mixture which is delivered to a diffusor for afterburning. The exhaust gases flowing to the twist generator pass through a heat exchanger which serves to preheat the combustion air. The twist generator may be a set of stationary whirl-imparting vanes or may be the rotor of an exhaust gas turbo charger directly driving an air compressor which delivers the air through the heat exchanger to the turbocharger, with some of the compressed air being delivered back to the engine. The flow area of the outlet of the twist generator is adjustable to control the quantity of air aspirated into the exhaust gases supplied to the diffusor. (Author abstract modified)

44804 **APTIC NO. 64979**

Knabe, Wilhelm and Siegbert Lucat

PASSIVE IMMISSION PROTECTION AGAINST AIR POLLUTANTS. MANY POSSIBILITIES NOT TAKEN ADVANTAGE OF YET. *(Viele Moeglichkeiten noch nicht genutzt). Text in German. Umwelt (Duesseldorf), 4(4): 28-31, 1974. 20 refs.*

Passive protection against emissions is no alternative to active combative measures, but only a supplement. The first such passive measure is the separation of residential areas from industrial areas and a better ventilation of streets. Forests are being planted increasingly as filters for air pollutants. Adjustment of the vegetation to air pollution by planting more resistant types such as deciduous trees instead of coniferous trees, or pears and plums in sulfur dioxide areas instead of apples and sour cherries is also increasingly being practiced. For passive emission protection of artifacts the following measures can be taken: storage in protected rooms, treatment of stationary objects with suitable preservers, or replacement of badly damaged parts by new ones.

44805 **APTIC NO. 68105**

Kurita, Manabu

DESULFURIZERS FOR HEAVY OIL AND CATALYSTS. *(Juyu datsuryu sochi to shokubai). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(9):37-40, Sept. 1974. 4 refs.*

Cobalt, nickel, molybdenum, and alumina are used as a catalyst for hydrodesulfurization in which the reactions occur at a temperature 350 to 430 C, a pressure of 50 to 250 kg/sq cm with hydrogen and oil in the ratio of 300 to 1000. These reacting conditions occur more mildly in indirect desulfurization than in direct desulfurization. The desulfurization rate by this method improves with increases in reacting temperature and pressure. Its apparent active energy shows a high value in the vicinity of 24 kcal/mol, which is calculated from an Arrhenius plot. Cracking, however, occurs more intensely at a temperature exceeding 430 C, producing carbon substances and vanadium on the surface of catalysts and reducing catalytic activity. Production of carbon substances is inhibited at a high hydrogen pressure. The metal composition ratio of a catalyst also affects its catalytic activity to a large extent. Cobalt and molybdenum or molybdenum trioxide and cobalt monoxide, for instance, show a high activity in the ratio of 0.2 to 0.6 and 6.5 to 12 wt% respectively. The endurance and activity loss of catalysts are important problems in desulfurization of distilled residual oil. Asphaltene in residual oil, unstable molecules producing carbon substances, oxygen compounds, and nitrogen are the original sources of activity loss in catalysts.

44806 **APTIC NO. 65720**

Kuroda, Yutaka, Yasuo Nakashima, Yoshimasa Hayashi, and Kunihiko Sugihara

AN EXAMPLE OF DEVELOPING LOW EMISSION ENGINE WITH CONSIDERATION FOR FUEL. *(Nenhi o koryo shit roemisshon enjin eno apurochi no ichirei). Text in Japanese. Preprint, Japan Automobile Technical Assoc., Tokyo, p. 259-264, May 1974. (Presented at the Japan Automobile Technical Association Lecture Meeting, Tokyo, Japan, May 1974, Paper 35.)*

An approach to the development of a low emission engine with reduced NOX level without sacrificing fuel efficiency is described. The reduction in hydrocarbon and carbon monoxide emission can be achieved by a thermal reactor in which the ignition time is delayed or air-fuel ratio is decreased, or by the use of catalysts. As for NOx, no catalyst suitable for continuous use is available at present. A comparative test of exhaust gas recirculation and ignition time delay indicated that fuel efficiency was reduced by 5-10% to attain the same amount of reduction in NO by the ignition time delay method. The reduction method by increasing air-fuel ratio was also compared with exhaust gas recirculation. At an air-fuel ratio of 15 or higher, the exhaust gas recirculation method was more efficienct. The NO emission can also be reduced by decreasing air-fuel ratio to lower than 15; however, it consumes more fuel. Reduction in NOX is achieved most efficiently by exhaust gas recirculation with the least increase in fuel consumption. The resulting increase in HC was treated with oxidizing catalyst. A bench test of the relationship between NO reduction, HC increase, and fuel indicated that a 50% reduction in NO can be achieved while maintaining the increase in HC by the exhaust gas recirculation to about 10% without increasing fuel cost. However, a more than 50% reduction in NO results in increase in HC and fuel consumption.

44807 **APTIC NO. 68243**

Maesawa, Yoshiharu, Jun Yagi, Masayuki Wakamiya, Harutoki Nakamura, Kyoichi Nagata, and Tominaga Keii

CLEANING OF AUTOMOTIVE EXHAUST GAS BY A CATALYST UTILIZING SILICA CLOTH AS A CARRIER (REPORT NO. 2); PROPERTY OF MESH CARRIER. *(Shirika kurosu wo tantai to suru shokubai ni yoru jidosha haiki gasu joka (Dai-2-ho)--Amimejo tantai no seishitsu--). Text in Japanese. Preprint, Catalytic Society of Japan, Sendai, p. 112-113, 1974. (Presented at the Symposium on Catalysts, 35th, Sendai, Japan, Oct. 4-5, 1974, Paper 4T06.)*

A catalyst for automotive exhaust gas purification was developed by utilization of silica cloth. Silica cloth was woven from high purity silica fiber (about 7 microns in diameter), with apparent specific gravity 0.49, thickness 0.53 mm, and nominal temperature of use 1300 C. Silica cloth has several desirable properties: magnitude of its geometrical surface area; flexibility; high resistance to heat; low resistance to gas flow; possibility of continuous production. A thin layer of silica was deposited on silica cloth; then a layer of alumina was deposited. Silica probably acts as binder, and increases adhesion of alumina. This cloth is immersed in a solution containing a predetermined amount of platinum. After drying, reduction with hydrogen was effected for 2 hours at 300 C. This platinum-impregnated cloth is used as catalyst for carbon monoxide oxidation experiments. Nearly 100% conversion was attained for 6.3 cc of catalyst (25 layers of cloth) at 900 C, for 50 hours, under atmospheric conditions. Oxygen excess to CO was about 1.3, and space velocity was 4.0 times 10,000/hr.

44808 **APTIC NO. 65419**

McBride, Warren L. and James F. Mosby

LOW-PRESSURE HEAVY DISTILLATE ULTRAFINING. *Preprint, Amoco Oil Co., Whiting, Ind., Research and Development Dept., 11p., 1974 (?).*

The development of a process for the low pressure hydrodesulfurization of heavy distillates as vacuum gas oils or decanted oils is described. The process operates at total pressures well below those conventionally used and can achieve 90% desulfurization on most feeds. For virgin feedstocks catalyst life will approach that obtained at high pressure, while even cracked stocks such as decanted oil will give satisfactory life. Investments can be reduced by 30-40% over conventional designs, leading to substantial savings in the overall cost of preparing low sulfur blending stocks. Hydrogen consumption is also substantially less for the low pressure design, leading to lower heats of reaction and simplified reactor design. Another advantage of the very low pressure operation is that it permits integration of a heavy distillate desulfurizer with other, lighter feed desulfurizers, thereby permitting additional savings. (Author abstract modified)

44809 **APTIC NO. 65677**

Meboldt, H.

PROBLEMS OF AIR POLLUTION WITH RESPECT TO EMISSION OF GASEOUS POLLUTANTS BY COMBUSTION PROCESSES. *(Probleme der Luftreinhaltung im Hinblick auf die Emission gasfoermiger Schadstoffe bei Verbrennungoprozessen.) Text in German. Tech. Mitt., 67(5):200-204, May 1974.*

Of the gaseous pollutants emitted during the combustion of coal, oil, and natural gas, sulfur dioxide and nitrogen dioxide are discussed in some detail. The emission of sulfur dioxide is not influenced by the combustion process but is solely determined by the sulfur content of the fuel. Efforts of the past twelve years have resulted in a reduction of the sulfur concentration in heavy fuel oil from 3.0% to 1.5%, in light fuel oil from 0.8% to 0.4%. The second method for reduction of the sulfur dioxide emission on which present efforts are concentrated is flue gas desulfurization. The extent of the nitrogen oxides emission is determined by the nitrogen concentration of the air supplied to the combustion process. The following nitrogen oxides emissions have been determined in remote heating plants and power plants: for coal-fired plants 0.5 to 1.5 kg/Gcal heating value, for oil-fired plants 0.15 to 1.3 kg no/Gcal, for gas-fired plants 0.1 to 0.7 kg/Gcal. Measures for reducing the nitrogen oxides emission include a reduction of the surplus air and the operating temperature, which can be achieved through two-stage combustion, waste gas recycling, and water injection, as well as waste gas cleaning. For waste gas cleaning absorption and reduction of nitrogen dioxide can be applied for which costs of 0.03 to 0.1 Pfenning/kwh must be appropriated. The dispersion of the emitted gases through high stacks is reviewed. With increasing stack height the emission concentration is shifted further away from the source and the maximum emission values shrink.

44810 **APTIC NO. 64981**

Moellenkamp, Friedrich-Werner

REMOTE HEAT - DEMAND, MAIN PROCESSES AND DEVELOPMENT TRENDS. *(Fernwaerme - Bedarf, hauptsaechliche Verfahren und Entwicklungstendenzen). Text in German. Energie Tech., 26(7/8): 170-177, 1974. 20 refs.*

The rising costs of oil and a new awareness of the necessity of reducing polluting emission have increased interest in remote heating. Aside from fossil fuel power plants which will be used as sources for remote heating, nuclear power plants with dry waste heat cooling towers will in the future be increasingly used for remote heat production. A combination with incinerators whose waste heat is used for power generation or remote heating is also feasible. Examples are already in operation, such as the incinerator/remote heating plant in the south of Munich. In this case better cleaning methods for the waste gases from incinerators will have to be developed. At present these gases are cleaned from dust only so that they carry about 1500 mg hydrogen chloride/cu m and 1000 mg SO2/cu m with a temperature of 250 C and a speed of 20 m/sec into the atmosphere. The possibilities of a trans-regional heat supply with integration of large fossil or nuclear power plants are discussed.

44811 **APTIC NO. 65175**

Morikawa, Kiyoshi

THE FUTURE OF PETROLEUM AND PETROCHEMICAL INDUSTRIES AND CATALYTIC REACTIONS. *(Sekiyu, sekiyukagaku kogyo no shorai to shokubai hanno). Text in Japanese. Preprint, Japan Petroleum Inst., p. 75-84, 1974. (Presented at the Japan Petroleum Institute Seminar, 17th, Tokyo, Japan, July 2-3, 1974.)*

The recent trend of the catalytic reaction technique is discussed briefly. In order to improve the activity and selectivity of catalyst, it is important to study the reaction mechanism. New processes are required and must be developed to save energy and materials. Kinetic study of air pollutant formation is also very important, since it can provide data for the protection of environment inside and outside of the plants. Air pollution- related catalytic reactions which are expected to be developed in the near future are catalytic decomposition of nitrogen oxides, liquid phase hydrogenation-decomposition of heavy oil, and reaction processes and plants for moving bed catalytic reactions. Examples of equilibrium constant evaluations for the formation of air pollutants including nitrogen oxides, sulfur oxides, and hydrogen chloride are given.

44812 **APTIC NO. 65531**

Munson, John G., Jr., Robert E. Lewis, George T. Weber, and William E. Brayton

CHARGING EMISSION CONTROL BY USE OF STAGE CHARGING. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1974. 1 ref. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-179.)*

A system designated as stage charging was developed for charging coal into the coke oven chamber without emissions to the atmosphere. The principles of the system are based on controlled sequential flow of the coal from the charging hoppers, during which the oven chamber is maintained under a very slight negative pressure condition by use of steam aspiration in the offtakes for on-the-main charging. The techniques are basic but require knowledge of the coal characteristics, adequate and properly maintained aspirating systems, including clean offtake piping, control of coal volume in the individual hoppers, and adherence by the operating crew to specific charging and leveling practices. (Author abstract modified)

44813 **APTIC NO. 68099**

Murakami, Keiichi

WAY OF THINKING AND PROBLEMATICAL POINTS ON DESULFURIZATION ON EXHAUST GAS. *(Haien datsuryu ni kansuru kangaekata to mondaiten (soron)). Text in Japanese. Sekko to Sekkai (Gypsum Lime), no. 130:123-124, May 1974.*

Technical problems in desulfurization of exhaust gas are presented. The absorbing velocity of sulfur dioxide is high while that of oxygen is low. The oxidizing velocity of oxygen is reduced due to its small partial pressure in exhaust gas. The velocity of exhaust gas is very high in boilers used currently by thermal power stations. It is, therefore, difficult to attain efficient absorption. When partial pressure of SO2 is high, resulting in inefficient absorption, the ratio of the amount of absorbing solution to the amount of exhaust gas is regarded as an important factor. The operation is likely to cause corrosion if conducted in the acidic range. The choice of materials is, in this case, crucial. Scaling is likely to occur if the operations are conducted in the alkaline range. Scale thus prouduced is not necessarily calcium carbonate. In some cases scale consisting of slaked lime, gypsum, and fluorides is produced. When sulfurous calcium is produced by absorption of SO2 into lime and converted to gypsum by means of oxidation, the absorption is conducted under alkaline conditions and oxidation under acid conditions.

44814 **APTIC NO. 68074**

Murakami, Taizo

DEVELOPMENT OF CYCLONE DUST COLLECTOR FOR SUBMICRON MICRO- PARTICLES (PART 2). *(Sabu mikuron-kyu no bifunjin o shushu suru saikuron shujinki no kaihatsu. (Dai-2-ho)). Text in Japanese. Kinki Daigaku Kogai Kenkyusho Kenkyu Hokoku (Kinki Univ. Pollut. Res. Inst. Rep.), no. 2:71-78, Oct. 1974.*

One of the reasons for low cyclone efficiency is that a part of the main vortex reaching to the end of the gas outlet is directly led out before dust separation. To prevent such direct flow into the gas outlet, a cyclone using double cylinders for gas outlet and an injecting air curtain jet flow from between cylinders was designed. To study the vortex pattern, the pressure was measured at eight locations through measurement holes made on the cyclone body. The distributions of tangential velocity and pressure were measured. In tests using talc, magnesium oxide, and calcium carbonate with highest particle size frequency of 2-8 micron, the collection efficiency was 90% for talc, 70-80% for MgO and 90-95% for CaCO3, which indicated an improvement of several % compared to the case of the cyclone without air curtain. The particle size distribution of talc before and after cyclone collection was measured by an optical microscopic method and a gravimetric sedimentation method. The minimum particle size for cyclone separation obtained by theoretical calculation was 0.54-0.59 micron.

44815 **APTIC NO. 65030**

Muzio, L. J., R. P. Wilson, Jr., and C. McComis

PACKAGE BOILER FLAME MODIFICATIONS FOR REDUCING NITRIC OXIDE EMISSIONS -- PHASE II OF III. *Ultrasystems, Inc., Irvine, Calif., Environmental and Applied Sciences Div., Environmental Protection Agency Contract 68-02-0222, Program Element 1AB014, ROAP 21ADG-43, Rept. EPA-R4-73-292-b, 76p., June 1974. 13 refs.*

A program to develop nitrogen oxides control techniques for small boilers is discussed. A 3.7 million Btu/hr oil combustor was used to investigate burner variations, flue gas recirculation, staged combustion, and combined recirculation and staged combustion, and combined recirculation and staged combustion while firing No. 6 oil. For burners tested, NOx was most sensitive to primary/secondary (P/S) air ratio and atomization air pressure (20% reductions with reduced P/S ratio and 20% reductions with increased atomization air pressure). Exhaust gas recirculation was effective if intimately mixed with the air near the burner. Nitrogen oxide reductions of 30%, with little tradeoff in smoke, were realized by adding recirculation through the total and primary air or gas ports. Recirculation had no effect through the secondary air or quarl injectors. Staged combustion was not as attractive as recirculation in this burner/combustor system due to increases in smoke emissions. Nitrogen oxide reductions greater than 25% could not be obtained without excessive smoke. Combined 25% staged combustion and 24% recirculation resulted in 45% NOx reductions with little increase in smoke. The most promising methods should be applied to two operating boilers during the next phase of the project. (Author abstract)

44816 **APTIC NO. 65614**

Nagane, Goro

ON ACTUAL RESULTS OF NAPHTHA BURNING. *(Nafusa daki no jisseki ni tsuite). Text in Japanese. Preprint, the Japan Society of Thermal Power Engineers, Tokyo, p. 51-63, 1974. (Presented at the Japan Society of Thermal power Engineers Training Conference on Fuel, Tokyo, Japan, March 29, 1974, Paper 5.)*

The power generation boilers of the Kawasaki Thermal Power plant of the Tokyo Electric Power Co., have been remodeled to use naphtha as fuel. Properties of naphtha fuel including the calorific value, the vapor pressure, the composition and specific gravity of the generated gas, the electric resistance, and the viscosity are discussed. Taking into account the properties or characteristics of the naphtha fuel, a naphtha combustion system including the feed pipelines and storage tank should be leak-proof and prevent vaporization of the fuel. A ventilation device, fire prevention measures (including prevention of static electricity and provision of anti-explosion protection), and safety facilities (including combustible gas leakage detector and fire fighting equipment) should also be provided. The naphtha-fueled boilers of the company have incorporated an exhaust gas mixing device for the purpose of oxides of nitrogen reduction. With a greater amount of the exhaust gas fed back for mixing, both the blue flame length and overall flame length tend to increase while the flame temperature decreases. Compared with heavy oil, naphtha fuel gives a lower flame temperature and combustion brightness. This consequently results in less radiation heat in the boiler furnace. This and other elements combine to make the thermal efficiency of a naphtha-fueled boiler lower than that of a heavy oil boiler. The reduction amounts to 0.2-0.5% in terms of the power generation efficiency. The factors causing the efficiency to decrease and the possible countermeasures to check them are briefly discussed. The NOx reduction effect of the naphtha fuel is also discussed.

44817 **APTIC NO. 68242**

Nagata, Kyoichi, Jun Yagi, Yoshiharu Maesawa, Masayuki Wakamiya, Harutoki Nakamura, and Tominaga Keii

CLEANING OF AUTOMOTIVE EXHAUST GAS BY A CATALYST UTILIZING SILICA CLOTH AS A CARRIER (REPORT NO. 1), OXIDATION OF INCOMPLETE COMBUSTION PRODUCTS BY PRECIOUS METAL CATALYSTS. *(Shirika kurosu wo tantai to suru shokubai ni yoru jidosha haiki gasu joka (Dai-ichi-ho)--Minensho seiseibutsu no kikinzoku shokubai ni yoru sanka--). Text in Japanese. Preprint, Catalytic Society of Japan, Sendai, p.110-111, 1974. 2 refs. (Presented at the Symposium on Catalysts, 35th, Sendai, Japan, Oct. 4-5, 1974, Paper 4T05.)*

Platinum catalyst (0.4 wt%) deposited on surface-treated silica cloth carrier (woven of high purity SiO2 fiber with diameter about 7 micron) was used to purify automobile exhaust gases (hydrocarbons, carbon monoxide, nitrogen oxides). Up to 25 layers of catalyst-impregnated cloth were used. This catalyst system has many advantages: flexibility; resistance to reduce effectiveness through friction due to vibrations or exhaust gas pulse flow; resistance to breakdown by sudden spot heating or cooling; and the possibility of continuous mass production of a uniform product. A purification muffler using catalyst cloth was attached to a 6-cylinder, 2000-cc gasoline engine, and tests were made, using regular leaded gasoline (0.03 g/l of lead). The catalyst weight increased by 3.5% on the average; decreasing tendencies were not observed. The noise emitted by the muffler was 60 phons, and showed much decrease in high frequency sound range emissions.

44818 **APTIC NO. 68246**

Nakamura, Harutoki, Jun Yagi, Yoshiharu Maesawa, Masayuki Wakamiya, Kyoichi Nagata, and Tominaga Keii

CLEANING OF AUTOMOTIVE EXHAUST GAS BY A CATALYST UTILIZING SILICA CLOTH AS A CARRIER (REPORT NO. 5)--CATALYTIC OXIDATION FOR EXHAUST GAS AFTER-TREATMENT--. *(Shirika kurosu wo tantai to suru shokubai ni yoru jidosha haiki gasu joka (Dai-5- ho)--Haiki gasu koshori sochi to shite no shokubai ni yoru sanka--). Text in Japanese. Preprint, Catalytic Society of Japan, Sendai, p. 118-119, 1974. (Presented at the Symposium on Catalysts, 35th, Sendai, Japan, Oct. 4-5, 1974, Paper 4T09.)*

By using layers of silicon cloth impregnated with 0.4 wt% platinum catalyst to treat automotive exhaust gases, and measuring the temperature of each layer, it is possible to follow the catalytic process as the exhaust gas passes through the converter. Two types of equipment were used for test runs. One was a cylinder which had silica cloth suspended in layers vertically to exhaust gas flow from a steady state engine (predetermined load; engine revolution, 1350 rpm; exhaust volume, about 2000 cc). The other was a radial flow type apparatus, where silica cloth was wrapped 25 times around steel tubing with holes. This converter was used with a 6-cylinder 4-cycle engine, having an exhaust volume of about 2000 cc., operated at idling, accelerating, steady state, and decelerating speeds. During idling, the first catalytic layers show reaction. For constant speed (80 km/hr), all the cloth layers approach uniform temperature. During acceleration, the first catalytic layers are cooled by the exhaust gas, and reaction takes place in the middle. During deceleration, high concentration of unburned hydrocarbons in low amount of exhaust causes a sudden increase in temperature of the first catalytic layers. By the ninth layer, most of the reaction has been completed.

44819 **APTIC NO. 65718**

Nakao, Yoshinori, Hiroshi Nakaya, and Aishi Nakai

FILTER MEDIUMS AND CHOICE OF A BAG FILTER. *(Baggu firuta no rozai to sentei). Text in Japanese. Kemikaru Enjiniyaringu (Chem. Eng.), 19(6):531-533, June 1974. 2 refs.*

The characteristics of several fabrics used as the filter medium of a bag filter and the choice of a filter bag are discussed. Teffon, which in the most widely used filter medium, is a polyester fabric produced through polymerization of ethylene and telephthalic acid. It is nearly as resistant as nylon to most organic and inorganic acids. The resistance of teflon decreases dramatically due to hydrolysis if moisture or heat are present in gas. Nylon, which is a polyamide fabric, includes nylon 6, nylon 6-6, and heat-proof nylon. It is superior to any synthetic fiber in terms of resistance, but it absorbs ten times as much water as Teflon. It is resistant to alkali or organic acids, but not against mineral acids, or peroxides of hydrogen. Nylon 6 and Nylon 6-6 remain stable in a temperature of only 100 to 110 C. Pyrene, a fabric produced through polymerization of propyrene, is widely used. Its characteristics are a small specific gravity and susceptibility to corrosion by nitric acid or sulfonic chloride at a high temperature, and caustic soda or caustic potassium at a high temperature and pressure. The items to be considered in the choice of a filter medium are discussed.

44820 **APTIC NO. 68234**

Nambu, Shyuya

FUEL INJECTION INTERNAL COMBUSTION ENGINE. *(Nissan Motor Co., Ltd., Tokyo (Japan)) U. S. Pat. 3,797,466. 5p., March 19, 1974. 7 refs. (Appl. July 21, 1971, 3 claims).*

A fuel-injected internal combustion engine which can be driven with a relatively lean combustible mixture without detriment to the firability and inflammability of mixture is designed to reduce emissions of hydrocarbons, carbon monoxide, and nitrogen oxides. The engine is provided with an improved combustion chamber which consists of a space usually employed as the combustion chamber and an additional space formed in the piston end wall. A fuel injection valve and a spark plug spaced from the valve are located in alignment with this additional space so that a major portion of the supplied fuel is distributed to the additional space in order to produce a relatively rich combustible mixture which can be readily ignited by the spark plug. A relatively lean mixture produced in the usual space of the combustion chamber is ignited by the aid of the flames resulting from the combustion of the rich mixture. (Author abstract modified)

44821 **APTIC NO. 65447**

Natusch, D. F. S., J. L. Hudson, R. L. Solomon, R. Tanner, and A. Miguel

ADSORPTION OF ODOROUS POLLUTANTS BY ACTIVE MANGANESE DIOXIDE (FINAL REPORT). *Illinois Univ., Urbana, School of Chemical Sciences, Environmental Protection Agency Grant R-801603, Program Element 1AB015, ROAP 21-AFB-010, Rept. EPA-650/2-74-063, 40p., June 1974. 7 refs.*

NTIS: PB 234458/AS

The adsorption of odorous pollutants by active manganese dioxide was studied. Hydrogen sulfide, mercaptans, and an amine were adsorbed in a fixed bed of active MnO2 impregnated on sawdust and on several activated carbons. Pollutant removal efficiencies were measured as functions of H2S concentration, flow rate, particle size, relative humidity, and bed depth. The outlet concentration of H2S from the MnO2-sawdust bed was considerably below that from the activated charcoal bed of the same volume and at the same conditions, often by more than an order of magnitude. The useful capacity of the MnO2-sawdust bed could be more than four times that of activated carbon. The efficiency of MnO2- sawdust was maximum at 80% relative humidity. The MnO2-sawdust bed acted catalytically when mercaptans and air were passed through it at room temperature: the disulfide was formed and there was no decrease in bed efficiency with time. Amines were adsorbed by the filter at an efficiency less than with activated carbon. Fundamental studies of the MnO2-sawdust were carried out, and preliminary correlations were made between bed efficiency and capacity and filter characteristics such as surface area, percent manganese, potassium, sodium, carbon, and the manganese valence state. (Author abstract)

44822 **APTIC NO. 65384**

Nelson, A. W.

DEVELOPMENT OF A REDUCED SMOKE COMBUSTOR FOR THE JT3D ENGINE. *Preprint, Society of Automotive Engineers, Inc., New York, 8p., 1974. 8 refs. (Presented at the Society of Automotive Engineers, Air Transportation Meeting, Dallas, Tex., April 30-May 2, 1974, Paper 74084.)*

A new combustor configuration having substantially lower smoke emission characteristics is now in the final stage of development for the JT3D commercial aircraft turbofan engine. The low-power emissions of hydrocarbons and carbon monoxide are also considerably reduced. This burner configuration uses many of the features developed in the JT8D turbofan engine smoke reduction program; however, it was also necessary to incorporate air assist fuel injection nozzles to achieve smoke levels below the Environmental Protection Agency regulation requirement of 25. Correction of a nozzle carbon formation problem and further durability testing must be accomplished before this combustor can be released for in-service commercial airline controlled- service use evaluation. (Author abstract)

44823 **APTIC NO. 65637**

Ochs, H.-J.

ELECTROSTATIC PRECIPITATOR FOR SEPARATION OF OIL MISTS. *(Elektro-Luftfilter zur Oelnebelabscheidung). Text in German. Metall, 28(8):767-771, Aug. 1974. 5 refs.*

Electrostatic precipitation with tungsten ionizing wires of 0.2 mm diameter, a voltage supply of 14,000 volts, and a flow velocity of the air of about 1.7 m/sec is most suitable for separation of oil mists from waste air from metal polishing stations. The ozone development with a maximum of 0.02 ppm remains below the maximum allowable working place concentration. Theoretical considerations of the collection efficiency were supplemented by practical measurements according to various methods. Most common for electrostatic precipitators is the test according to the American Society of Heating, Refrigeration, and Air Conditioning Engineers guidelines 52-68 which base on Dill s discoloration test. With natural atmospheric pollutants an average collection efficiency of at least 90% was observed. Reduction of the entrance speed to less than 1 m/sec raised the collection efficiency to near 100%. Apart from the entrance velocity the collection efficiency is also influenced by the velocity distribution across the entrance cross section and by voltage fluctuations. The same is true for the frequency. For the collection of polluted oil mists a mechanical air filter should precede the electrostatic precipitator for collection of the coarser pollutants. The precipitators are usually cleaned by spraying with warm (60 C) water and detergent.

44824 **APTIC NO. 68103**

Oohara, Takashi

CLARIFIERS FOR VEHICLE EXHAUST GAS AND CATALYSTS. *(Jidosha haigasu joka sochi to shokubai). Text in Japanese. Kagaku Kọjo (Chem. Factory), 18(9):47-51, Sept. 1974. 7 refs.*

The following factors have to be taken into consideration when catalysts are developed. The activity of catalysts must be maintained for many hours. The catalyst must possess sufficient mechanical strength not to undergo a change in its form after being used for many hours. The catalysts should be produced at low price. They should be available from natural resources in large quantity. The surface area of the catalysts must be large so that they have high activity. Gamma-alumina is used as a carrier to meet this condition. In this case catalysts with a surface area of 100 sq m/g seem to work very well. Connected to the exhaust gas line of an engine, a catalytic converter in which granular catalysts are packed undergoes external influences when a vehicle runs in many different conditions in various driving modes. Changes in gravity, engine vibration, and pulse from the engine exhaust gas combine to destroy the catalysts. When catalysts are packed in a converter, an inter-catalyst void is bound to be present, causing the catalysts to move. Consequently they wear out due to friction resulting from movement of the catalysts. In addition they are destroyed by the presence of a void which occurs inside the converter. To prevent this catalysts should have a high compression strength. In respect to the cost of catalysts, the following factors must be considered: the amount and price of precious metals to be used, the price of a carrier, and the cost required for processing catalysts.

44825 **APTIC NO. 65600**

Orth, Helmut

CITY CLEANSING. *(Staedtereinigung.) Text in German. VDI Ver. Deut. Ingr. Z. (Deusseldorf), 116(9):679-685, June 1974. 91 refs.*

A literature review is given of papers published in the years 1972 and 1973 on the subjects trash collection, street cleansing, winter service, and general development trends under which all state laws regulating the disposal of solid waste in the states of the Federal Republic of Germany are listed. Efforts to reduce exhaust gas emission by collection trucks lead to a switch to liquid gas operation at several points in West Germany. An overall switch to liquid gas operation, however, is not feasible because of insufficient supply of liquid gas. Trucks for garbage collection with automatic gears were tested for the first time. Electric drives in trash collection trucks are being used for the first time in Duesseldorf. The trash quantity rose again in 1973 over the previous year. In Duesseldorf it rose by 6%. The trash accumulation per capita and year was 289 kg in 1973.

44826 **APTIC NO. 65258**

Panzer, Jerome

IDLE EMISSIONS TESTING - PART III. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1974. 5 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-130.)*

Emissions deterioration was investigated by observing for 1 yr a fleet of 396 cars that had been inspected for idle and 2500 rpm emissions and then tuned up. All cars were then reinspected and repaired. Between inspections a large percentage of the cars encountered performance problems obvious to the drivers and required servicing, especially to ignition systems. These cars produced a large hydrocarbon increase, which has a major effect on the emissions deterioration of the total car population. The average carbon monoxide level tended to remain constant for 10-12 mo and then rose rapidly, while hydrocarbons rose sharply during the first few months, and then leveled off. If performance problems were voluntarily corrected by emissions-oriented repair, the average CO reduction during the year between inspections would equal the CO reduction achieved at the initial tune up. The mean HC level would rise so that two thirds of the initial reduction would be lost. If emissions-oriented repairs were made when the cars were inspected or driveability problems occurred, rejection rates at reinspection could be expected to decline. Rejecting and repairing 50% of the car population would produce the same emission effect as requiring all cars to be repaired. The incremental emissions reduction obtained by increasing the rejection rate fell off at rejection rates above 30%. (Author abstract modified)

44827 **APTIC NO. 65533**

Patton, R. S.

HOODED COKE QUENCHING SYSTEM FOR AIR QUALITY CONTROL. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 24p., 1974. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-182.)*

A prototype quench car system was designed to enclose, cool, and clean the smoke generated during the entire push and quench cycle in coke processing. The system consists of existing coke guide fitted with a smother closure and a removable containment/ quenching hood mounted on the existing quench car; existing locomotive; and a new trailer control car carrying environmental control equipment. The gas from the pushed coke is drawn into the hood. After the push is completed, and while in the quench area, hood quenching sprays are activated and the coke is quenched with an optimum volume of water to control emissions and minimize water retained in the coke. The cleaning system consists of a hot water powered jet spray exhauster, mounted on the trailer control car, which creates a negative pressure inside the quench hood and by a process of nucleation and entrainment, scrubs pollutants from the gas stream. The hot water and entrained pollutants are condensed in demisting device and are collected in an on-board sump for recycle. Atmospheric discharge from the demister is water vapor. The trailer control car carries all pumping, heating, cleaning, demisting, and control equipment. (Author abstract modified)

44828 **APTIC NO. 65703**

Petersen, Gerd

SEPARATION OF AEROSOLS BY AGGLOMERATION. *(Niederschlagung von Aerosolen durch Agglomeration). Text in German. Wasser, Luft Betrieb, 18(8):440-443, 1974. 5 refs.*

After a general discussion of wet collectors for dust particles the centrifugal agglomerator is described. The dust-laden gas enters tangentially the spiral casing of the agglomerator. The entrance is dimensioned to permit gas velocities of 20 m/sec. The entering gas impacts on a fly wheel rotating in the same direction thus raising the speed of the gas to 60 m/sec. The acceleration of the gas from 20 to 60 m/sec is achieved gently to that no particles are thrown out of the flow. Past the fly wheel the gas enters an empty room and is drawn to the center by a ventilator, which further increases the speed to more than 100 m/sec. Through the rising velocity and the decreasing radius of the agglomerator strong centrifugal forces begin to act on the dust particles. Through the different speed with which they begin to move radially outward a first collision and agglomeration of particles is achieved. Agglomeration of fluid is enhanced by injection of a fluid. Most of the fluid remains in the agglomerator and is not carried into the following cyclone. The fluid is drawn off from the various points and returned to the process. The cyclone is succeeded by an exit spiral where the high rotational energy of the gases is converted into static energy. Through installation of this exit spiral the energy consumption has been considerably reduced so that total energy costs amount to only 4 to 5.5 kWh/1000cu m gas for removal of particles down to 0.05 micron.

44829 **APTIC NO. 65564**

Phillips, Robert J.

OPERATING EXPERIENCES WITH A COMMERCIAL DUAL-ALKALI SO2 REMOVAL SYSTEM. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 24p., 1974. 5 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-235.)*

A developmental program by General Motors to find an environmentally acceptable means of burning coal in industrial-size power plants is presented, involving a dual-alkali wet-scrubbing system for removal of sulfur dioxide. The SO2 removal system cost $3.5 million and was designed to handle a steaming capacity of 400,000 lb steam/hr. The system utilizes a sodium hydroxide scrubbing solution to absorb SO2 and particulate matter from the flue gas. The spent scrubbing solution is then recausticized with lime and reused in the scrubber while the precipitated sulfur salts are dried and sent to landfill. The process design, equipment selection, and operating experiences to date are reviewed. Equipment performance, SO2 removal capability, process reliability and control, sulfate formations, lime utilization, calcium ion control, and waste cake disposal are summarized.

44830 **APTIC NO. 68123**

Plassmann Eberhard, Dieter Hassel, and Wilhelm Bruns

STUDIES CONCERNING THE EFFECT OF CARBURETOR ACCESSORY UNITS WITH REGARD TO IMPROVEMENT OF THE EXHAUST GAS QUALITY OF OTTO ENGINES IN OLD AUTOMOBILES. *(Untersuchungen ueber die Wirkungsweise von Vergaser-Zusatzgeraeten im Hinblick auf eine Verbesserung der Abgasqualitaet von Ottomotoren in Altfahrzeugen). Text in German. Tue Tech. Ueberwach., 15(10):357-363, Oct. 1974. 9 refs.*

The performance of carburetor accessory units, which are supposed to reduce the carbon monoxide and hydrocarbon concentration in automobile exhausts through enlargement of lambda, i.e., through producing a lean mixture, were tested. Some of these units also delay ignition with the effect of further reducing the hydrocarbon emission and of reducing the oxides of nitrogen emission. The examined carburetor accessory units could be grouped into two classes. The first class supplies additional air to the suction tube between carburetor and engine, regulating the quantity of additional air either in dependence of the underpressure in the intake tube or by the position of the throttle valve. The second class comprises units which achieve a lean mixture through modification of the throttle valve or through measures behind the throttle valve. The units were tested in five automobiles of different make. The results revealed in some cases considerable reductions of the CO and hydrocarbon emissions and a slight rise of the NOx emissions. The driving and operating properties of the engine were adversely affected, which may affect traffic safety. The cause for this is the unoriented production of a lean mixture in the idle and in the lower partial load range, which cannot be prevented.

44831 **APTIC NO. 65749**

Popa, George Dan, Cezar Victor Amira, and Liliana Maria Popa

EXPERIMENTAL STUDY OF THE CORRELATION BETWEEN THE DESIGN AND FUNCTIONAL FACTORS AND EXHAUST GAS-GENERATED AIR POLLUTION BY DIESEL ENGINES. *(Studiu experimental privind corelatia dintre factorii constructiv-functionali ai motoarelor diesel si poluarea atmosferei cu gaze de evacuare). Text in Rumanian. Rev. Transp. Telecomun., 1(2):77-84, 1974.*

The correlation between design and functional factors and the exhaust gas-generated air pollution by diesel engines was studied. A monocylindric, 4 rate, IT9 3 diesel engine with a turbulence chamber was used. The influence of combustion quality upon smoke in emission depends on diffusion velocity of combustion, diffusion temperature of the flame, and quantity of air available for the burning of the injected fuel. Increase in rotation velocity positively influences combustion up to a point. An increase of the compression volumetric relation must be coordinated with the optimum advance injection in order to maintain smoke emissions at an acceptable level. The quality of combustion depends especially upon the injection characteristics, such as pulverization, dispersion, and jet penetration.

44832 **APTIC NO. 65563**

Powell, E. M., J. G. Singer, P. G. Maurin, and J. R. Martin

DESIGNING FROM EXPERIENCE WITH 900 MW OF AIR QUALITY CONTROL SYSTEMS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 24p., 1974. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-234.)*

Advances in wet-scrubber technology as a means of making high-sulfur coal an environmentally acceptable source of energy are presented. Combustion Engineering, Inc. offers a summary of the C-E AQCS Design Experience. Either limestone or lime can be used to remove sulfur dioxide from boiler flue gases in a marble-bed wet-scrubbing system. Prevention of calcium sulfite and sulfate scaling and high-removal efficiencies for SO2 can be concurrently achieved. The wet-scrubbing system can employ a high level of recycling and yet remain free of calcium sulfate scale by proper design of the reaction tank. This does not mean that 100% closed systems can be operated. Soluble species such as magnesium, sodium, chloride, and phosphates must be bled off from the system to prevent concentration, by evaporation, to levels with corrosion potential. Considering system design, precollection of particulate matter, coupled with the capability of bypassing the SO2 removal system, increases availability and reliability. Induced-draft scrubbers provide the best combination of safety and efficiency for reliable operation. Multiple scrubber systems facilitate control and maintenance. Design flexibility and component redundancy enhance system reliability. (Author summary modified)

44833 **APTIC NO. 65262**

Reynolds, Joseph P., Louis Theodore, James Marino, and Luigi de Francesco

THE GENERATION OF PERFORMANCE CURVES FOR ELECTROSTATIC PRECIPITATORS THROUGH THE USE OF A NEW TECHNIQUE FOR CALCULATING COLLECTOR EFFICIENCIES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 30p., 1974. 6 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-137.)*

A model for calculating collection efficiences was used to generate performance curves for 12 industries presently using electrostatic precipitators. These industries include the electric power, cement, pulp and paper, steel, chemical, and petroleum industries. The performance curves describe thee predicted collection efficiency as a function of precipitator length, plate-to-plate spacing and average field strength, and are presented in graphical, tabular, and equation form. Whenever literature values are available for a particular industry, comparisons are made between the collection efficiencies generated by the new model and those based on actual precipitator performance. The collection efficiency in the new model is sensitive to particle size distribution, a complication that cannot be treated in the Deutsch-Anderson equation which permits the use of a single representative particle size only. (Author abstract modified)

44834 **APTIC NO. 65230**

Roberts, Richard and Perry Goldberg

LOW-EMISSION COMBUSTOR DESIGN FOR AIRCRAFT GAS TURBINES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1974. 12 refs (Presented at the Air Pollution Control Association, Annual Meeting 67th, Denver, Colo., June 9-13, 1974, Paper 74-86.)*

The magnitude of emission reduction required by the EPA standards for 1979 are summarized, indicating what must be achieved from a combustion point of view if the regulations are to be met, and describing three combustion chamber design approaches which are being pursued. The simultaneous control of carbon monoxide and nitrogen oxides emissions requires the application of technology which is yet to be demonstrated in hardware suitable for flight engine applications. Consideration is given to performance, operational, and durability requirements which must be satisfied by any flight-qualified combustion chamber. Three low-emission combustor designs are described: NASA swirl-can modular combustor, the staged premix combustor, and the swirl combustor. All represent an increase in complexity over conventional combustor designs. Variable combustor geometry, such as modulation of combustion or dilution airflow, may be required. Variable geometry represents a substantial increase in complexity, both in terms of combustor liner hardware and actuator system.

44835 **APTIC NO. 65593**

Roberts, R. E. and J. B. Roberts

AN ENGINEERING APPROACH TO EMISSION REDUCTION IN AUTOMOTIVE SPRAY PAINTING. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 24p., 1974. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-279.)*

Unacceptable costs and energy usage are incurred by the use of any known add-on of equipment in paint spray booths and ovens to treat the large volumes of air currently discharged containing low levels of solvent. A solvent emission profile exists along the length of typical spray booths and ovens. Selective collection of exhaust from solvent-rich zones and discard of exhaust from solvent-lean zones could reduce air volumes requiring abatement. By maximizing use of automatic painting, reducing booth length, avoiding longitudinal intermixing between manual and automatic painting zones, and staging of solvent-laden air exhausted from manual zones through automatic zones, only 10% of the currently discharged air needs to be treated to meet the 3000 pounds per day limitation per source. For such reduced volumes, the investment for emission reduction is more acceptable. Moreover, the hot gases emitted after abatement, such as in an incineration system equipped for heat exchange, can be used an an energy source. The reduction in fuel for booth air heating resulting from reduced booth air usage, coupled with heat from solvent combustion, should provide nearly a 35% reduction in fuel energy requirements for the automotive color area. (Author abstract modified)

44836 **APTIC NO. 68121**

Roots, D. C.

THE ELIMINATION OF ATMOSPHERIC POLLUTION FROM COATING AND DRYING OVENS. *Clean Air, 4(15):5-9, Autumn 1974.*

Thermal incinerators are the only practical method for reducing hydrocarbon emissions from coating and drying ovens. The high cost of gaseous and liquid fuels requires the designer to incorporate the most efficient means of fuel saving into the incineration system. Three systems in current use are discussed, each having different combinations of heat recovery apparatus tailored to the specific needs of the process. The incinerator used in the systems in the Hirt/Hygrotherm unit developed for destroying HC in air streams. System one was designed for ovens in which aluminum is painted or coated. The exhaust fume is taken from the fans to a common header duct. The exhaust is then taken to the incinerator-forced draught fan which blows the fume through the preheater where it is raised in temperature before entering the incinerator inlet plenum. The flue gases then pass through the incinerator combustion chamber, the fume preheater, two fresh air heaters, and the chimney. System two is used to remove synthetic resins and solvents from the exhaust air from electrical insulating material manufacturing. Fume enters the preheater when the temperature is raised by heat exchanged from the outgoing flue gases, then the plenum, the furnace section, the fume preheater, a heat exchanger, and the chimney. System three is used in motor car manufacturing industries. The fume is ducted to the fume preheater via the fan, enters the incinerator plenum at an elevated temperature, is cooled in the fume preheater, is recycled to the oven where the heat is recovered.

44837 **APTIC NO. 64985**

Rusch, H.

FLUE GAS FILTER FOR HEATING SYSTEMS FIRED WITH LIGHT OIL. *(Rauchgasfilter fuer Leichtoel-Heizungsanlagen). Text in German. Sanit. Heizungstech., 29(8):530-531, 1974.*

Regardless of the boiler construction and the type of burner or careful burner adjustment soot, dust, iron oxide, and sulfur compounds are emitted from heating systems fired with light fuel oil. For collection of these pollutants a flue gas filter is described. It consists of a disposable glass-fiber material which tolerates off gas temperatures of up to 300 C. It retains all particles larger than 5 micron. Including casing and duct resistance a pressure difference of 0.0007 to 0.001 bar must be overcome. The collection efficiency is 93%.

44838 **APTIC NO. 65428**

Schwitzgebel, K., F. B. Meserole, C. M. Thompson, J. L. Skloss, and M. A. McAnally

DEVELOPMENT OF SAMPLING AND ANALYTICAL METHODS OF LIME/LIMESTOME WET SCRUBBING TESTS (FINAL REPORT). *Radian Corp., Austin, Tex., Environmental Protection Agency Contract CPA 70-143, Program Element 1AB013, ROAP 21ACY-25, Rept. EPA-650/2-74-024, Radian Rept. RAD-073-013, 81p., March 1974. 23 refs.*

Sampling and analytical methods to be used at a limg/limestone scrubbing sulfur dioxide removal test facility were developed. Three problem areas are encountered in analyzing thermodynamically unstable slurry streams in lime/limestone scrubbing processes: sampling, sample handling, and chemical analysis. A positive pressure filtration minimized the mass transfer phenomena during the filtration step to an acceptable level. Quenching of the filtered liquid was chosen to avoid change in sample composition. Two sets of analytical methods were selected for application at the plant. The back-up methods were based on atomic absorption spectrophotometry and wet chemical procedures. The rapid field methods were based on X-ray fluorescence, atomic absorption, and wet chemical analyses. The X-ray fluorescence spectrometer was automated by interfacing it with a NOVA 1200 minicomputer. Additional peripheral devices had the function of processing all raw data. The raw data were input to the system with a card reader, a teletype, or a CRT. The final results were stored on a magnetic tape. A hard copy was provided by a printer. The sampling system was used to determine liquid composition including chlorides, carbon dioxide, sulfur dioxide, total sulfur, total nitrogen, nitrate and nitrite, calcium, magnesium, potassium, sodium, and trace elements and to determine solid phase characterization. (Author abstract modified)

44839 **APTIC NO. 65375**

Shannon, L. J.

CONTROL TECHNOLOGY FOR FINE PARTICULATE EMISSIONS (FINAL REPORT). *Midwest Research Inst., Kansas City, Mo., Environmental Protection Agency Grant R-801615, ROAP No. 1AB012-05, Program Element 1AB012, Rept. EPA-650/2-74-027, 225p., May 1974. 186 refs.*

Results are presented from a study to assess the state-of-the-art of control technology for fine particulates emitted from stationary sources, with emphasis on the control of primary particulates. Topics covered include: particle collection and agglomeration mechanisms; conventional control equipment which includes electrostatic precipitators, fabric filters, and wet scrubbers; emerging control systems such as the steam-hydro air cleaning system, the ADTEC wet scrubber, and the wetted-knit mesh filter; proposed control systems including condensation scrubbers, charged droplet scrubbers, foam scrubbers, electrified filters, granular bed filters, fluidized beds, gamma-ray precipitators, and sonic agglomerators; and recommendations for research and development programs.

44840 **APTIC NO. 65613**

Shushlyakov, A. V. and V. P. Boyko

REMOVAL OF PEAT DUST FROM GASES IN SEED-COATING PLANTS. *(Ochistka gazov ot rotfyanoy pyli pri proizvodstve drazhirovannykh semyan). Text in Russian. Torf. Promy., no. 5:18-19, 1974.*

The separation of peat dust from gases in a seed-coating plant by means of cyclones and bag filters was studied. The gas to be pruified contained 0.1-3.78 g dust/cu m. Over 50% of the dust was in the 3-80 micron fraction, while 9.1% were smaller than 3 micron. A one-stage dry cyclone operated with a secondary gas ratio of at least 30% of the primary gas volume had an efficiency of 96%. The separation efficiency of the bag filter fell from an initial value of 97% to 35% in 6 mo.

44841 **APTIC NO. 68233**

Speece, Richard E.

RECYCLING GAS CONTACT APPARATUS. *(Assignee not given.) U. S. Pat. 3,804,255. 5p., April 16, 1974. 6 refs. (Appl. Oct. 18, 1972, 8 claims).*

A recycling gas contact apparatus which allows for absorption of gases in contact with a fluent material confined to a downflow stream of decreasing velocity within the device is described. The apparatus consists of a container enclosing a body of fluent material below an upper surface, a downflow conducting means for confining flow of the fluent material to a flow stream of maximum velocity at an upper inlet end and minimum velocity at a lower outlet end, a flow inducing means for recycling flow of the fluent material through the inlet end of the downflow conducting means for a region within the container, and a gas injecting means connected to the flow conducting means at a predetermined location below the inlet end for introduction of the gas into the flow stream at an initial buoyant bubble velocity less than the velocity of the flow stream. All bubbles of the gas are conveyed to a stagnation zone of zero bubble velocity within the flow conducting means above the lower outlet such that no bubbles rise within the container to the upper surface. A bubble harvesting means is provided for collecting gas bubbles within the stagnation zone, with the gas collected being vented to prevent turbulence within the container.

44842 **APTIC NO. 68095**

Springer, Karl J. and Ralph C. Stahman

CONTROL OF DIESEL EXHAUST ODORS. *Ann. N. Y. Acad. Sci., vol. 237:409-426, Sept. 27, 1974. 19 refs. (Presented at the Conference on Odors: Evaluation, Utilization, and Control, Oct. 1-3, 1973.)*

Attempts to reduce diesel exhaust odors, particularly from city buses, are reviewed along with some of the problems associated with odor measurement. Most research on diesel exhaust odor utilizes the Environmental Protection Agency Diesel Odor Quality-Intensity Rating System which consists of 28 plastic squeeze bottles, each partially filled with a different intensity or odor. A trained panel routinely evaluates simultaneously presented dilute exhaust in terms of the squeeze bottle standards. The major problem in odor research is the lack of a relatively simple but precise odor indicator other than the nose. Among the many odor control methods attempted, the use of DF-1 diesel fuel and improved fuel injectors along with increased upshift speeds appear to offer promise for reducing exhaust odors. Less complicated measurement procedures are required, however, before substantial commitments can be made by manufacturers in designing engines with essentially negligible exhaust odor.

44843 **APTIC NO. 64977**

Tatsumi Toshio and Ren Yasuda

RECOVERY OF FLUORIDES AND THEIR REUSE IN THE ALUMINUM REFINING INDUSTRY--CONSTRUCTION OF AN ALCOA DRY SCRUBBER. *(Aruminium seiren kogyo ni okeru fukkabutsu no kaishu to sono sairiyo--Arukoashiki dorai sukuraba no kensetsu). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(8):81-84, Aug. 1974.*

A dry scrubber for hydrogen fluoride recovery was discussed. Gases containing fluorides from an electrolytic furnace are introduced to the reactor where a flow bed is formed and HF is absorbed on alumina. Particles and dusts in the gas are collected with a bag filter above the flow bed and removed periodically. Clean gas which passes through the bag filter is released from the top of the reactor. Distribution of gas in the reactor is homogeneous and the area efficiencies which determine the reactor efficiency are high. The depth of the flow bed can be adjusted between 50 and 300 mm. The bag chamber above the flow bed comprises a row of bag filters and shaking rods. The total height of the bag chamber is 8 ft. Flue gases to the reactor were introduced from the main duct through a number of branch ducts designed to give an optimum operation cost.

44844 **APTIC NO. 65497**

Thekaekara, Matthew P.

DATA ON INCIDENT SOLAR ENERGY. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th, Symp, Sol. Energy Util., Washington, D. C., 1974, p. 21-48. 35 refs. (April 30.)*

The current energy crisis has generated a large volume of research on direct conversion of solar energy for practical applications. Quantitative data on solar irradiance is an important input for these studies. The spectral distribution of this energy is also important since all collecting devices in general and solar cells in particular are spectrally sensitive. Total energy at ground level can be derived only as an integral of the spectral energy. Precise measurement of the total and spectral solar irradiance at ground level at each location, all year long, is extremely laborious. Therefore, values of the solar constant and zero air mass solar spectrum were determined which are available as an American Society of Testing and Materials standard. The values are reviewed as to their absolute accuracy and intrinsic reliability. The instrumentation for monitoring solar irradiance and the question of radiation scales is discussed. The extraterrestrial values were used for deriving solar irradiance data at ground level for a large variety of atmospheric parameters, with special reference to air pollution. The results are presented in the form of graphs and tables. The effects of diffuse sky radiance and of varying slopes for the solar energy collecting surface are examined. Average values of the solar energy available at different locations in the United States are presented. (Author abstract modified)

44845 **APTIC NO. 65579**

Thomas, Thomas R. and Dallas T. Pence

REDUCTION OF NOX WITH AMMONIA OVER ZEOLITE CATALYSTS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 12p., 1974. 10 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-258.)*

Removal of nitrogen oxides and sulfur dioxide from stack gases of coal-fired power plants involving the reduction of nitric oxide with gaseous ammonia using a zeolite catalyst is discussed. Removal of 98.6% of the 500 ppm NO in a simulated flue gas atmosphere containing 3000 ppm SO2 was achieved at a bed temperature of 660 F and space velocity of 6000 hr to .01 power. The potential for a combined NOx-SO2 abatement system and a cursory cost analysis are discussed. An NOx abatement process has been described on a laboratory scale that is highly efficient and specific for removal of low levels of NOx in the presence of water, carbon dioxide, oxygen, and SO2; uses synthetic mordenite catalyst which is highly resistant to sulfur poisoning and acid attack; meets practical design criteria suitable for industrial applications; and has excellent potential for SOx removal.

44846 **APTIC NO. 65707**

Tippmer, Kurt

PROCESSES AND PROBLEMS OF AMMONIA ELIMINATION. *(Verfahren und Probleme der Ammoniak-Vernichtung). Text in German. Chem. Ing. Tech., 46(15):628-635, 1974. 12 refs.*

In many cases a conversion of ammonia in coke oven gases to ammonium sulfate (fertilizer) is not useful. It must then be eliminated by oxidation to nitrogen and water or catalytically to N2 and hydrogen. Several processes are available for this which are combined with the simultaneous removal of hydrogen sulfide. The absorption of NH3 with NH3 incineration with and without heat utilization, the NH3 absorption with catalytic cracking of NH3, H2S and NH3 scrubbing with NH3 incineration and production of sulfuric acid (78 or 96%), as well as H2S and NH3 scrubbing with catalytic cracking of NH3 and production of pure sulfur are discussed in great detail. A cost comparison of these methods is provided. Lowest investments are required for an NH3 scrubbing process with elimination of NH3 but without desulfurization. Expenditures for an NH3 scrubber with desulfurization of the coke oven gas to about 1.5 g H2S/cu m and NH3 incineration with production of 78% H2SO4 are lower than those for the production of 96% H2SO4. For the latter there is more demand, however. Desulfurization to about 0.7 g H2S/cu m is only slightly more expensive. The process producing sulfur in combination with an H2S oxidation method requires somewhat lower investment costs.

44847 **APTIC NO. 68063**

Toyoda, Teiji

CLEAN ENERGY OBTAINED FROM COAL. *(Sekitan kara no kuriin energi). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 10(5): 1718-1721, May 1974.*

An abstract of a report of the branch committee of the Energy Committee of the Council of Industrial Technology is reviewed. Among various energy sources, coal is the most abundant and long-lasting. The estimated amount of underground coal is 460,000 million tons. The annual consumption of coal was 2190 million tons in 1971. One merit of coal is that it is widely spread all over the world, whereas most of the other fossil fuels are produced in only particularly locations on the earth. Various processes are being developed for the production of clean energy. The production of artificial natural gas from coal, liquefaction of coal, and gas formation by the use of plasma are good examples. In the U.S.A., fuel gases have been produced under high pressure. The heat of combustion of these gases is 8400-9000 kcal/cu m. This gas will be mixed with natural gas and supplied to users in the near future. According to the American method, coal is treated on a fluidized bed with oxygen, hydrogen, and steam. The gas thus produced is then treated in a conversion furnace to give methane.

44848 **APTIC NO. 65231**

Troth, Dennis L., Albert J. Verdouw, Jerry G. Tomlinson, and Robert G. Dodd

EMISSION RESPONSE FROM EXTENDED LENGTH, VARIABLE GEOMETRY GAS TURBINE COMBUSTOR. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 31p., 1974. 3 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-87.)*

A program to analyze, select, and experimentally evaluate low emission combustors for aircraft gas turbine engines is conducted to demonstrate a final combustor concept having a 50% reduction in total mass emissions (carbon monoxide, unburnt hydrocarbons, oxides of nitrogen, and exhaust smoke) without an increase in any specific pollutant. Research conducted under an Army Contract established design concepts demonstrating significant reductions in CO and UHC emissions. Two of these concepts were an extended length intermediate zone to consume CO and UHC and variable geometry to control the primary zone fuel air ratio over varying power conditions. Emission reduction features were identified by analytical methods employing both reaction kinetics and empirical correlations. Experimental results were obtained on a T63 component combustor rig operating at conditions simulating the engine over the complete power operating range with JP-4 fuel. A combustor incorporating both extended length and variable geometry was evaluated and the performance and emission results are reported These results are compared on the basis of a helicopter duty cycle and the EPA 1979 turboprop regulation landing take off cycle. The 1979 EPA emission regulations for P2 class engines can be met with the extended length variable geometry combustor on the T63 turboprop engine. (Author abstract modified)

44849 **APTIC NO. 65259**

Tsao, K. C.. O. K. Foo, and Y. Y. Tom

EFFECT OF CATALYTIC CONVERTER ON ROTARY COMBUSTION ENGINE EXHAUST. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1974. 8 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-131.)*

The effect of a monolithic catalytic converter on rotary combustion engine exhaust was investigated at various engine operating conditions. The concentrations of hydrocarbons and carbon monoxide were determined by flame ionization detection and non-dispersive infrared methods. The percentages of reduction of hydrocarbons and CO concentrations were affected by the inlet gas temperature of the monolithic converter, the loading, the air-fuel ratio, the speed, and the intake manifold pressure of the operating engine. The compatibility of the catalytic converter to reduce rotary engine emissions is demonstrated by the difference of gas temperatures before and after the converter, even though the efficiency depends on several physical and chemical factors. The acidity of condensed water vapor from exhaust gases, before and after the converter, was analytically titrated. The preliminary experimental data show that the acidity of the condensed water vapor is greater after the catalytic treatment. (Author abstract modified)

44850 **APTIC NO. 65577**

Urbanic, J. E. and W. D. Lovett

THE USE OF ACTIVATED CARBON FOR CONTROL OF PAINT BAKE OVEN EMISSIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1974. 5 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-255.)*

The results of pilot studies demonstrating the feasibility of using adsorption on activated carbon as a means of significantly reducing the hydrocarbon emissions from a paint bake oven exhaust at an automobile assembly plant are presented. Under the test conditions it was necessary to cool the exhaust to 100 F prior to entering the adsorber, in order to remove high boiling compounds which would quickly foul the activated carbon. Under these conditions, a six-inch deep bed of Type BPL 4 by 10 activated carbon operating at a velocity of approximately 20,000/hr removed more than 90% of all organic in excess of C3 from the oven exhaust. A technique for desorbing the adsorbed organics in a concentrated stream using oven exhaust as a desorbent was also demonstrated. Desorption at 300-320 F with heated oven exhaust for a period of 2 hours produced a desorbate stream 16 times more concentrated than the original exhaust. This technique reduced the total volume of air that would ultimately need to be incinerated to 4% of its original volume. Under these circumstances, after 11 cycles, the average breakthrough capacity of the activated carbon bed was 10% by weight. In addition, the temperature of desorption is limited by the ignition temperature of the saturated carbon system, if oxygen is present in the desorbing stream. Also, the rate of heating during desorption will have a bearing on the peak concentration and shape of the desorption curve. (Author abstract modified)

44851 **APTIC NO. 68129**

Usui, Katsuhiko

BAD ODOR OF FEATHER PROCESSING PLANT AND CONTROL MEASURES - REMOVAL OF HYDROGEN SULFIDE.

(Feza shorijo no akushu to boshi taisaku - shu to shite ryuka suiso no jokyo ni tsuite). Text in Japanese. Japan Environmental Health Center, Proc. Conf. Environ. Health, 18th, Fukui, Japan, 1974. p. 86-87. (Oct. 3-4.)

The new type of cooker for the processing of feathers in which the entire process from heating to drying is carried out in a completely sealed system is replacing the old type of steam boiler which emitted great quantities and concentrations of malodor. The water evaporated from the processing material is condensed by the jet ejector method, spraycondenser method, or thermal exchange method. In all cases, the malodorants produced are dissolved in water and disposed with waste water. However, the waste water containing a large amount of malodorant, particularly hydrogen sulfide, becomes a new source of malodor unless it is treated properly. The sulfide concentration in the waste water sampled during the processing with the highest malodor concentration and H_2S in gaseous form were measured by gas chromatography. The variation in sulfide concentration in water with stirring and aeration time was measured and the result indicated that H_2S in water could be removed relatively readily by the aeration. The H_2S removed from the waste water is then treated with ferrous sulfate solution. The treatment of black sludge and many other malodorants produced during the processing are still unsolved problems.

44852 **APTIC NO. 65373**

Van Ness, R. P. and James Jonakin

CALCIUM HYDROXIDE SCRUBBING: LOUISVILLE GAS AND ELECTRIC TAKES THE PLUNGE.

Prof. Eng., 44(5):25-26, May 1974.

The air pollution control system installed at a 65-Mw steam plant at Louisville Gas and Electric s Paddy s Run power station is described. The system had been gradually improved over the years, so that the plant now meets sulfur dioxide and particulate Federal emission standards. The system includes an electrostatic precipitator with 99.4% efficiency which will be improved to 99.6% by 1977 and sulfur dioxide removal by scrubbing with a carbide lime additive.

44853 **APTIC NO. 65412**

Vitovec, Jaroslav, Josef Vecera, and Jiri Smolik

SEPARATION OF NONVOLATILE PARTICLES FROM GAS MIXTURES DURING SUBLIMATION IN ELECTROSTATIC PRECIPITATORS.

(Zachycovani netekavych castic z plynne smesi pri sublimaci v elektrostatickem odlucovaci). Text in Czech. Chem. Prumysl (Prague), 24/49(4): 192-194, 1974. 5 refs.

Terephthalic acid, which is used in the manufacture of nylon, must be purified, preferably by sublimation. The acid is prepared by thermal decomposition of its ammonium salt, prepared by reacting potassium terephthalate with ammonia. However, the ammonium terephthalate still contains 0.2% potassium. An electrostatic precipitator (semi-pilot plant size) was used in an effort to reduce the potassium content of the gas phase during sublimation to the permissible maximum of 20 ppm. Sublimation was carried out at 170 C in an inert atmosphere (nitrogen or superheated steam). After passing the precipitator, the mixed gases were condensed, and the nonvolatile content of the terephthalic acid was determined by atomic emission spectroscopy. The results depended mainly on the velocity of the gas phase but the potassium content was invariably around 10 ppm. Similar experiments with isophthalic and benzoic acid produced similar results.

44854 **APTIC NO. 65391**

Watson, H. C., E. E. Milkins, and J. V. Deslandes

EFFICIENCY AND EMISSIONS OF A HYDROGEN OR METHANE FUELLED SPARK-IGNITION ENGINE.

Melbourne Univ., Parkville (Australia), Dept. of Mechanical Engineering, Rept. T/8/74, 7p., Feb. 1974. 21 refs.

The use of hydrogen and methane as fuels for a conventional spark ignition engine was investigated to establish the optimum operation conditions for minimum emissions, best fuel economy, and power output over the normal speed ratio encountered in automobile power plants. A high-speed engine was specially adapted to permit admission of gaseous fuels. Nitrogen oxides emissions were higher with H_2 and CH_4 than with gasoline at the same air-fuel ratio. By increasing air-fuel ratios, NO_x emissions were reduced, and some power loss was restored by increasing compression ratios. The working point selected for H_2 or CH_4 fueled engine operation will be determined by the trade off between emissions, fuel economy, and power weight ratio. Curves are presented to guide the designer in selecting engine design parameters such as compression ratio, spark timing, and air-fuel ratio. (Author abstract modified)

44855 **APTIC NO. 65392**

Watson, H. C. and E. E. Milkins

HYDROGEN--AN ALTERNATIVE AUTOMOTIVE FUEL.

Preprint, Melbourne Univ., Parksville, Victoria (Australia), Dept. of Mechanical Engineering, 15p., March 1974. 19 refs.

The feasibility of using hydrogen as a fuel for automotive application was examined. Tests were conducted using a Waukesha High Speed ASTM-CFR spark ignition engine. Exhaust emissions, engine performance, power output, and thermal efficiency are reported. The exhaust gas was collected at a site 10 cm from the exhaust valve and passed simultaneously through chemiluminescent, nondispersive infrared, and gas chromatographic analyzers. The gas was monitored for nitric oxide, nitrogen dioxide, oxygen, hydrogen, and nitrogen. Hydrogen produced less power than liquid fueled engines, and nitrogeen oxides emissions were higher at the same equivalence ratio. There were no carbon monoxide or hydrocarbon emissions. A speed controlled limit to the supply might be desirable to limit NO_x emissions or fuel wastage at low speeds by excessively fuel rich operation. Such control could be easily achieved by sensing air flow rate as in the simple gas carburetor.

44856 **APTIC NO. 65733**

Yamaguchi, Takaaki

DESULFURIZATION AND DENITROGENATION BY HYDROGENATION REFINING.

(Suisoka seisei ni yoru datsuryu to datsu chisso). Text in Japanese. Japan Petroleum Inst., p. 21-29, 1974. (Presented at the Japan Petroleum Institute Seminar, 17th, Tokyo, Japan, July 2-3, 1974.)

A brief discussion of desulfurization and denitrogenation is given. Generally, an indirect desulfurization method has a limit of reducing the sulfur content in crude oil to 0.2 to 0.3 wt%, while the direct method has a limit of 1.0 to 1.2 wt%. The recent trend of the indirect method is the reduction of pressure at the reaction tower from more than 1000 psig to below 800 psig due to the improvement of catalyst characteristics; scale up of the operation to 40,000 barrels/day per tower; improvement of efficiency to more than 90%; reduction of S content to less than 0.1 wt%; and removal of hydrogen sulfide by absorption. The recent trend of the indirect method is the development of a high performance catalyst; reduction of S content to less than 0.5 wt%; and prevention of pressure loss at the catalyst layer in reaction tower. The crude oil from Mideast countries contains 0.09 to 0.22 wt% of nitrogen, while the reduced pressure residual oil contains up to 0.70 wt% of N. Results of desulfurization and denitrogenation by six different hydrogenation processes reveal that the VGO Isomax process reduces more than 90% of S and more than 80% of N from Kuwait VGO, while the Amoco Pilot process reduce 63% of S and only 9% of N from Arabian heavy oil.

44857 **APTIC NO. 65580**

Yamamoto, Osamu, Suguru Fukui, Haruo Nishino, Yohji Kameoka, and Junichi Miyakazi

SIMULTANEOUS REMOVAL OF NOX AND SO2. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1974. 9 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-259.)*

Simultaneous removal of sulfur dioxide and nitrogen oxides in boiler flue gases by the wet scrubbing method using bench and pilot plants is described. Nitric oxide, which is the most predominant of nitric oxides and is only slightly absorbed into water and aqueous solutions, is ozone-oxidized to provide an adequate proportion of NO:NO2. The oxidized flue gas is then introduced into a packed-bed absorber, where an absorbent flows countercurrently, and the simultaneous absorption of NOx and SO2 takes place. The system has a high removal efficiency for SO2 and NOx. Ozone consumption was slightly higher in the pilot plant than the amount that was calculated from the bench plant data to give an adequate NO:NO2 ratio. The absorbed SO2 is air-oxidized with a ferric catalyst in a bubble tower linked with the absorber to form sulfuric acid. The sulfuric acid is then neutralized by lime or limestone in a crystallizer and is removed from the system as gypsum. Approximately 30-40% of the absorbed NOx was converted into nitric acid and approximately 30% into N20. The rest was changed into nitrogen gas.

44858 **APTIC NO. 68231**

Yuzawa, Masaharu

CLARIFYING DEVICE OF EXHAUST GAS. *(Assignee not given.) U. S. Pat. 3,803,813. 4p., April 16, 1974. 5 refs. (Appl. May 15, 1972, 5 claims).*

A device for clarifying and adsorbing automobile exhaust emissions is described which overcomes disadvantages of a previous similar design regarding splashing of the clarifying liquid and difficulties in replacing the activated carbon adsorbent. The clarifying tank, preferably containing an alkaline clarifying solution, has a pipe nozzle extending adjacent its bottom wall and formed with several apertures along its upper surface. An exhaust gas inlet pipe is connected to the pipe nozzle, and an exhaust gas outlet pipe communicates with the clarifying tank through the top wall thereof. An upright lattice grid is positioned in the tank above the pipe nozzle to prevent overflowing of the clarifying solution when the automobile is on a grade and to prevent loss of the clarifying solution by splashing. Valve means are provided for withdrawing and replenishing the clarifying solution. An adsorption casing is interposed in the exhaust gas outlet pipe and contains several longitudinally spaced transversely extending blocks of activated carbon. The box has a top cover which may be opened to easily remove and replace the activated carbon blocks. A filter net and a splash-preventing baffle are interposed, in the flow direction, between the lattice grid and the exhaust gas outlet pipe. A liquid level gauge is provided on the exterior of the tank. (Author abstract modified)

44859 **APTIC NO. 65172**

THE WELLMAN-LORD METHOD--MITSUBISHI AND SUMITOMO CHEMICAL ENGINEERING COS. *(Weruman rodo-ho Mitsubishi Kakoki, Sumitomo Kemikaru Enjiniaringu). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(8):62-63, Aug. 1974.*

The method consists of three steps: absorption of sulfur dioxide with sodium sulfite solution as an absorbent, treatment of the resulting sodium bisulfite solution with stream to regenerate Na2SO3 and SO2, and condensation of SO2. The condensed SO2 can be recovered as 100% pure SO2, solid S, sulfuric acid, or calcium sulfate. Flue gas is first introduced into the first stage of the absorbing tower where it is washed by press scrubber and dust and SO3 are removed. The resulting gas is led to the second stage where more than 90% of the SO2 is absorbed. The rich solution of NaHSO3 is pumped to a heater to which steam is supplied and Na2SO3 is precipitated. The precipitated Na2SO3 is transferred to a container and HaOH solution is added to dissolve them. The solution is then recycled to the absorbing tower for use. The method was employed by 11 plants with total flue gas emission ranging from 20,000 to 700,000 N cu m/hr. Most of the SO2 was recovered as H2SO4 or sulfur.

44860 **APTIC NO. 65455**

(Inventor not given.)

METHOD AND APPARATUS FOR THE REMOVAL OF ENTRAINED GASES FROM LIQUIDS OR FROM SLURRIES OF SOLIDS, LIQUIDS AND GASES. *(Autometrics Co., Boulder, Colo.) Brit. Pat. 1,343,815. 6p., Jan. 16, 1974. (Appl. April 21, 1971, 11 claims).*

This invention relates to the removal of entrained gases from liquids or from mineral slurries and pulps. The apparatus comprises a liquid-receiving tank having an inlet and an outlet, a liquid-receiving chamber of circular cross-section having an inlet and outlets for gas and liquid and being rotatable about a vertical axis within the tank. The chamber is defined by a surface of revolution having upper and lower surfaces each converging from a maximum dimension adjacent the axis of rotation to a minimum dimension at the periphery. The inlet of the tank communicates with the inlet of the chamber, the liquid outlet of the chamber comprising at least one opening at the periphery providing communication between the interior of the chamber and the tank below the normal liquid level within the tank. The vacuum means communicates with the gas outlet to exhaust gases and maintain the chamber under a reduced pressure.

44861 **APTIC NO. 65617**

Kanagawa Prefectural Pollution Control Center (Japan)

REMOVAL OF HARMFUL ELEMENTS IN AUTOMOTIVE EXHAUST GASES BY CATALYTIC CONVERTERS. *(Shokubai konbata nado ni yoru jidosha haishutsu gasu-chu no yugai seibun no jokyo). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 16:165-168, Feb. 1974.*

The effectiveness of catalytic converters, the water jet type exhaust control device, and fuel additives for controlling the amount of carbon monoxide, hydrocarbons, nitric oxide, and acrolein was examined. Nondispersive infrared spectrometry, chemiluminescence, and 4-hexyresorcin were used for analyses. The efficiency of catalytic converters differed greatly depending on the car used and the manufacturer of the catalyst. The average area reduction at 10,000 km mileage ranged between 80% and 15% for CO and between 59% and 15% for HC, for seven different converters. The amount of NO increased or was reduced drastically depending on the converter, and the tendency was difficult to pinpoint. But those that increased showed a marked increase with the installation of the converter. The removal of acrolein by the catalytic converter was approximately proportionate with the removal efficiency for CO. The water jet method of control did not show a clear effect on CO and HC, but had some effect on the NO removal, especially at the time of high speed driving. The fuel additive had almost no effect on any of the toxic gases.

1973

44862 **APTIC NO. 65711**

Aoki, Hidesato

REMOVAL OF NITROGEN OXIDES BY WET TYPE OXIDATION-ABSORPTION METHOD. *(Shisshiki sanka kyushuho ni yoru NOx jokyo). Text in Japanese. Environmental Conservation Engineering Study Group (Japan), Proc. Semin. Meas. Attenuation, Removal Nitrogen Oxides Combust Gas, Osaka, Japan, 1973, p. 193-205. (Nov. 8-9.)*

Denitration processes for exhaust gases from metal surface treatment processes developed by Fuji Kasui Kogyo Co., Ltd. are briefly described with reaction mechanisms, procedures, and flow diagrams. The nitrogen oxides concentration at the inlet and outlet are 300-400 ppm and less than 200 ppm for the sodium hypochlorite method (Japanese Patent No. 418928), 250-500 ppm and less than 150 ppm for the chlorine-ammonia method (Japanese Patent No. 5766679), 600-1000 ppm and about 100 ppm for the activated charcoal method, 400-600 ppm and less than 60 ppm for the sodium chlorite method, and 500-3000 ppm and 50-80 ppm for the activated charcoal-sodium chlorite method, respectively. The desulfurization system has been in operation since May 1973 with an extremely high desulfurization efficiency of 99.5%. As for the denitration process for combustion gas by the activated charcoal-sodium chlorite method, a denitration efficiency of 95% was achieved by the 500 N cu m/hr scale, long term testing. The first denitration system of 62,000 N cu m/hr scale for boiler exhaust gas is under construction. In this process, Fujimon-OX (chlorine type oxidizing agent consisting primarily of chlorine dioxide) is used as an oxidizing agent, and the oxidation time required for 100% oxidation is less than 1 second. For the denitration absorption, Fujinon-N solution is used. The inlet and outlet concentrations of NOx are 2O5 ppm (NO 200 ppm) and less than 10 ppm (NO 0 ppm), respectively.

44863 **APTIC NO. 65316**

Banchik, I. N.

THE WINKLER PROCESS FOR THE PRODUCTION OF LOW-BTU GAS FROM COAL. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 163-178. (Sept. 10-14.)*

The Winkler Process for producing low-BTU gas from coal using a fluidized bed is described. Either air or oxygen may be used as a gasifying medium depending on the ultimate use of the produced gas. The system can gasify a full range of solid fuels from lignite through coal, however, some coals are more suitable for gasification than others. The gasification temperature decreases with higher reactivity. With increasing gasification temperatures, overall efficiency decreases due to increased sensible heat loss in solids. With decreased reactivity, losses in unburned solids increase. The process can gasify coal with high ash content. Material requires only crushing and the high cost of grinding and high maintenance costs due to high ash content are avoided. Usually coals with high ash content are considerably cheaper and sources of feed coal are greatly expanded. The Winkler Generator can also gasify liquid fuels such as coal tars and heavy fuel oils. The bulk of the fly ash in the gas leaving the Generator is removed in the waste heat train and cyclone. The ash and dust removed therein, as well as that which leaves the Generator bottom can be transported dry in a pneumatic system or as a slurry in water for disposal. Residual ash fines in the gas leaving the cyclones must be removed to permit compression and/or further processing. This final clean-up is accomplished in two stages; the first being a direct contact wet scrubber and the second an electrostatic precipitator.

44864 **APTIC NO. 65313**

Bodle, William W. and K. C. Vyas

CLEAN FUELS FROM COAL-INTRODUCTION TO MODERN PROCESSES. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 49-89. 29 refs. (Sept. 10-14.)*

Some of the principle processes considered for converting fuel to clean fuels are described. Processes for conversion to gas are grouped into three categories according to the heating value of the gas produced: medium or high-Btu processes with the alternative of low Btu including Lurgi, Winkler, Bi-Gas, Synthane, ATGAS, and HYGAS processes; medium- or high-Btu processes only, including HYGAS, hydrane, Koppers-Totzek, CO2 Acceptor, and Molten Salt; and low Btu only processes, including U-Gas. Coal to oil or solid processes are divided into three categories according to the method of processing: from Synthesis Gas (Fischer-Tropsch), Sasol; prolysis, including COED and TosCoal; and dissolution, which includes Synthoil, H-Coal, CSF, and SRC.

44865 **APTIC NO. 65358**

Buettner, Leonhard, Ernst Schuetz, and Gerhard Zhuber-Okrog

RECOVERY OF MERCURY FROM GAS MIXTURES. *(Verfahren zur Gewinnung von Quecksilber aus Gasen). Text in German. (Preussag AG Metall, Goslar (Germany)) W. Ger. Pat. Appl. 2,305,522. 4p., Feb. 5, 1973. (3 claims).*

Mercury is recovered nearly quantitatively from gas mixtures resulting from the oxidizing roasting of concentrates of sulfidic ores of zinc, lead, or copper, by reaction with nascent sulfur produced by reaction between hydrogen sulfide or its source, e.g., sodium sulfide with sulfur dioxide in presence of condensing water vapor. The resulting solid mercury sulfide is collected (special filters may be used to collect residual colloidal Hg S suspended in the gas mixture) and processed by the known methods to obtain pure Hg.

44866 **APTIC NO. 65334**

Carlson, Franklin B., Louis H. Yardumian, and Mark T. Atwood

THE TOSCOAL PROCESS: COAL LIQUEFACTION AND CHAR PRODUCTION. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 367-381. 3 refs. (Sept. 10-14.)*

The Toscoal Process, using hot ceramic balls as a heat source, produces coal char with a high heating value plus oil and gas from high moisture content, low heating value, sub-bituminous coal. One objective of the process is upgrading the heating value of sub-bituminous coals in order to reduce the Btu cost of transporting the fuel to distant markets. Compared to coal, the char product is both dustier and more polymorphic, and conventional coal handling methods are not fully suitable for the char product. A second objective of the process is recovery of hydrocarbon liquids. Oil produced would be suitable for use as an environmentally acceptable fuel oil. Pilot plant studies and investment and operating cost estimates are presented.

44867 **APTIC NO. 65680**

Chwalibog, Henryk

ON PROTECTION OF ATMOSPHERIC AIR FROM SULPHUR DIOXIDE POLLUTION. *(Uwagi o ochronie atmosfery przed emisya SO2). Text in Polish. Chemik (Gliwice), 26(9):342-347, 1973.*

The study emphasizes the hazard of sulfur dioxide and other sulfur compounds emitted to the air, especially from Claus installations, and advocates utilization of sanitary chimneys as well as the oxygen method in the production of sulfuric acid. The main industrial emission gases are carbon and sulfur dioxides. The major generators are coal and oil combustion and the chemical industry, especially installations for gas purification and chemical synthesis. In Poland, the emission of power plants and steel works reaches 3,000,000 ton/yr, and the emission of the chemical industry from 200 to 280,000 ton/yr, i.e., to 9% of the total emission. Concentrations which are biologically safe can be obtained by building sanitary chimneys which disperse most of the pollutants. The appropriate height of the chimneys is calculated on the basis of the frequency and intensity of the winds in the given region.

44868 **APTIC NO. 65335**

Cox, John L.

CATALYSTS FOR COAL CONVERSION. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 311-340. 79 refs. (Sept. 10-14.)*

The generalized application of catalysts to coal conversion is reviewed. Coal conversion has been categorized as pyrolysis, solvent extraction, direct hydrogenation, and indirect hydrogenation. The use of catalysts in each of these areas is presented with emphasis upon the more recent developments and pertinent references to the earlier work. Although the overall objectives (influencing rates and selectivities) in using catalysts are the same for each of these types of coal conversion, there is considerable latitude and scope within each area. Not only are catalysts important for effecting the primary conversion, e.g., pyrolysis, but they are also important in subsequent processing and the type of catalyst selected often depends upon the desired product. (Author abstract)

44869 **APTIC NO. 65671**

Daikura, Masahito, Mitsunobu Ogasawara, Toshimi Takajo, and Takamitsu Yoshimoto

ATTENUATION OF NO FORMED BY TURBULENCE-DIFFUSED FLAMES CAUSED BY LOCAL INJECTION OF INERT GAS. *(Fukassei gasu no kyokusho funsha ni yoru ranryu kakusan kaen kara no No seisei no teigen). Preprint, Japan Society of Mechanical Engineers, Kansai Branch, p. 75-78, 1974. 2 refs. (Presented at the Japan. Soc. Mech. Eng., Kansai Branch Meet., 49th, 1973, Paper 3412.)*

Nitric oxide is formed in a very limited high temperature area near the flame, and an effective decrease of temperature will lower the NO formation. The NO formation was reduced by supplying inert gas (nitrogen) into the limited high temperature zone. Hydrogen and propane were jet injected from nozzles of 2 mm diameter, both at 25 C, H2, at 340 cc/sec, and propane at 90 cc/sec. The combustor was a vertical pyrex tube of 133 mm diameter, with the burner underneath. The combustion gas was sampled by a stainless tube of 0.8 mm. The NO was analyzed by a non-dispersive infrared analyzer, and other components were analyzed by gas chromatography. The N2 gas was locally jet injected by a doughnut ring with holes made of a copper tube of 6 mm diam. When hydrogen was used as fuel, the temperature was successfully lowered by mixing N2 gas, and the NO formation could be drastically reduced. Jet injection of N2 at a very limited area of high temperature point was most effective. The thermodependency of NO reduction rate was smaller than the figure calculated by the Zeldovich mechanism. However, in propane flames, the NO reduction rate was much smaller than the theoretical figure and could not be explained by the non-balance of O2 concentration. A mechanism other than the Zeldovich theory must be discovered.

44870 **APTIC NO. 65320**

Farnsworth, J. Frank, Howard F. Leonard, D. Michael Mitsak, and Reginald Wintrell

PRODUCTION OF GAS FROM COAL BY THE KOPPERS-TOTZEK PROCESS. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 143-162. (Sept. 10-14.)*

The Koppers-Totzek (K-T) Process for the production of gas from coal is described as an example of versatile and pollution-free technology. The process is capable of continuous operation for the gasification of a variety of feedstocks, including all ranks of coal, char, petroleum coke, tars, heavy residuals, light to heavy oils, and pumpable slurries of carbonaceous materials in liquid hydrocarbons. The change-over from solid to liquid feeds involves only a change of the burner heads. Multiple feed burners permit wide variations in turn down ratio. The process is capable of instantaneous shutdown with full production resumed in 30 minutes. The process is essentially pollution-free. Gasification products are gas (free from tars, condensable hydrocarbons, ammonia, and phenol) and slag. The gas is cleaned by high-energy scrubbers and electrostatic precipitators. No complicated precision mechanical equipment or pressure sealing devices are required. The only moving parts at the gasifier are screw feeders for solids or pumps for liquid feedstocks. Simplicity and a minimum of moving parts result in little maintenance between scheduled annual maintenance. K-T units are designed for coal feed rates up to 850 tons per day. This process has over 20 years of safe operation. The on-stream time or availability is better than 95%. Gasifier overall thermal efficiency is 85 to 89%.

44871 **APTIC NO. 65397**

Fessler, Leroy Edwin

CATALYTIC CONVERTER APPARATUS AND USE THEREOF. *(Universal Oil Products Co., Des Plaines, Ill.) Brit. Pat. 1,313,378. 9p., April 11, 1973. (Appl. Sept. 15, 1970, 13 claims).*

This invention relates to an improved catalytic converter vessel for use in the catalytic oxidation and conversion of vehicle exhaust gas streams and in preferred embodiments to a converter construction which incorporates a segment-cylinder-form catalyst retaining section supported by the outer housing of the converter in a slidable manner, thus preventing structural damage due to temperature differentials within the converter. This invention embodies the advantages of the cylindrical type converter and the advantages of a flat bed converter and yet retains a minimum of their disadvantages.

44872 **APTIC NO. 65336**

Fink, Carl E.

THE CO2 ACCEPTOR PROCESS. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 301-309. 2 refs. (Sept. 10-14.)*

The CO2 Acceptor Process is presented as a unique fluidized bed system developed by Consolidation Coal Company to produce pipeline gas from lignite or subbituminous coal. The gasifier operates at a pressure of 150 psi and a temperature in the range of 1500-1550 F. Heat for the exothermic steam-carbon reaction is supplied primarily by the exothermic reaction of calcium oxide with carbon dioxide. The lime-bearing material, which can be eithe limestone or dolomite, is called the acceptor. The use of the acceptor offers three major advantages. First, the acceptor is heated and calcined in a separate reactor where air can supply the oxygen for combustion without contaminating thye product gas. This eliminates the need for an oxygen plant. Second, the required circulation rate is lower than in other heat carrier processes since most of the heat is supplied chemically. Third, the acceptor reacts with both hydrogen sulfide and CO2, the principal impurities in the gasifier product gas, thus minimizing the gas cleanup requirements.

44873 **APTIC NO. 65319**

Forney, A. J., W. P. Haynes, J. J. Elliott, S. J. Gasior, G. E. Johnson, and J. P. Strakey, Jr.

THE SYNTHANE COAL-TO-GAS PROCESS. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 199-207. 7 refs. (Sept. 10-14.)*

The development of the Synthane Coal-to-Gas process at the U. S. Bureau of Mines laboratories is discussed. The pretreatment of caking coals, gasification of various coals, the purification step, and the methanation step are described. The Synthane process has proven operable in a pilot plant, and scale-up appears feasible. The two most critical steps in the process are gasification and methanation. Gasification by the Synthane Process offers the promise of broad flexibility in type of coal feed, high throughput rate of coal and commensurate low initial cost, high methane content of gasifier product, and low oxygen consumption. Methanation by the Synthane Process offers the promise of high throughputs (up to 120 scfh feed gas per sq. ft. of catalyst surface), long catalyst life (more than 4 months operation), and high yields of product gas (more than 240,000 scf of high-Btu gas per lb of catalyst. Condensate water is the most serious potential source of water pollution in the Synthane Process. The ideal solution for handling the condensate would be to convert it to steam and recycle it back to the gasifier. (Author summary modified)

44874 **APTIC NO. 65322**

Frank, Marshall E. and Bruce K. Schmid

ECONOMIC EVALUATION AND PROCESS DESIGN OF A COAL-OIL-GAS (COG) REFINERY. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 577-600. (Sept. 10-14.)*

An economic evaluation and conceptual design of a processing system for conversion of coal to oil and gas, designated as a COG refinery, is presented. The first phase of the work involved screening and evaluating several alternate process configurations to develop the process combination with the best potential economics for producing both pipeline gas and a light liquid suitable as feedstock to a refinery. In the second phase a detailed conceptual design and economic evaluation was worked out for this process combination. The COG refinery produces 332 million SCFD of 1065 Btu/SCF pipeline gas and 100,000 BPD (barrels per day) of a coal-derived liquid suitable for processing in a conventional fuels refinery. This liquid product, referred to as light refinery liquid, is a 650 F end point, 35 API gravity oil rich in aromatics and naphthenes with essentially nil sulfur content. In addition, the plant produces 20,670 BPD of LPG, 2480 TPD of solvent refined coal and 1805 TPD of sulfur. The major raw materials are 57,700 TPD of a typical Kentucky-Illinois coal and 7,740 TPD of oxygen. The coal conversion complex combining several processes currently developed shows considerable promise for production of high Btu pipeline gas, a liquid feed stock for a petroleum refinery, and a low-sulfur fuel for power plants. A significant feature is that a large part of the methane is obtained together with the liquid products by direct hydrogenation, eliminating a costly methanation step. Some methane is also produced directly by gasification of a part of the coal, but the primary function of the gasification step is to produce hydrogen for the hydrogenation steps. The cost of pipeline gas production by such a scheme is significantly less than for the more well-known gasification processes now under development. (Author summary)

44875 **APTIC NO. 65456**

Fuerst, Ernst, Karl Merkel, and Harald Stahl

REMOVAL AND RECOVERY OF SULFUR DIOXIDE FROM GAS CONTAINING THE SAME. *(Badsische Anilin- and Soda-Fabrik Aktiengesellschaft, Ludwigshafen (Germany)) Brit. Pat. 1,323,736. 2p., July 18, 1973. (Appl. Nov. 18, 1970, 4 claims).*

A process is described for removing and recovering sulfur dioxide from gas containing SO2 by absorption of the SO2 from the gas in an organic solvent followed by desorption of the dissolved SO2. The solvent used is an amido or imido reaction product of one mole of a bis-(gamma-aminopropyl) ether of a glycol with two moles of a monobasic or dibasic carboxylic acid respectively having two to eight carbon atoms. Disadvantages resulting from to high a vapor pressure of the solvent during absorption are reduced with the use of the solvent in the present invention.

44876 **APTIC NO. 65317**

Grace, Robert J.

DEVELOPMENT OF THE BI-GAS PROCESS. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 179-197. 3 refs. (Sept. 10-14.)*

The principal findings of several phases of the research and development program at Bituminous Coal Research, Inc. which led to the initial design features for Stages 1 and 2 of the BI-GAS gasifier are reviewed. The purpose of the on-going methanation research program and the general arrangement of the five ton-per-hour gasifier for the Homer City pilot plant are also presented. The BI-GAS process offers several advantages in the production of synthetic natural gas; a high yield of methane is obtained directly from coal and subsequent processing of the product gas is minimized. Because it is entrained rather than a fixed or fluidized-bed system, all types of coal should be amenable without prior treatment for use in this gasifier. The conditions in stage 2 are such that no tar and oils are formed in the gasification process. All the feed coal is consumed in the process. Principal by-products are slag for disposal and sulfur for sale. The two-stage gasifier, being an integral unit, is relatively simple in design and amenable to scale-up to most any size. When the gasifier is operated on air, rather than oxygen, at moderate system pressures, a gas is produced which may be readily desulfurized and cleaned to yield a pollution-free fuel gas with a heating value of about 175 Btu per standard cubic foot. The BCR system makes use of a high-pressure fluidized-bed reactor. Minimum gas recycle will be used. The process catalyst must be able to operate under a concentration of carbon monoxide as high as 25%. The recycle rate cannot be estimated as heat transfer characteristics have not been studied. The PEDU program will provide data in this area. The use of non-nickel catalyst types permits high-temperature operation and the production of other light hydrocarbons.

44877 **APTIC NO. 65351**

Gysin, H.

ACTIVITIES OF THE CHEMICAL INDUSTRY IN ABATING ENVIRONMENTAL POLLUTION. *Beckman Instruments Process S.A., Geneva (Switzerland), Proc. Int. Symp. Environ. Meas., Geneva, Switzerland, 1973, p. 165-171. (Oct. 2-4.)*

Air pollution control in the chemical industry is generally reviewed. Methods of removing sulfur dioxide from gases, scrubbers, combined air purification systems, pilot plants, and control methods using small amounts of energy are discussed.

44878 **APTIC NO. 65457**

Hardison, Leslie Claire

METHOD AND MEANS FOR TWO-STAGE CATALYTIC TREATING OF AN EXHAUST GAS STREAM FROM AN INTERNAL COMBUSTION ENGINE. *(Universal Oil Products Co., Des Plaines, Ill.) Brit. Pat. 1,323,608. 5p., July 18, 1973. (Appl. Nov. 27, 1970, 8 claims).*

This invention provides an improved process for treating an internal combustion engine exhaust gas stream, by providing for the catalytic reduction of nitrogen oxides in the exhaust gas stream in a first stage catalyst section followed by oxidation of carbon monoxide and residual hydrocarbons in a second stage catalyst section. The invention provides passing the exhaust gas stream without cooling and without admission of air into a first zone containing reduction catalyst and therein catalytically reducing nitrogen oxides, subsequently mixing air with the resulting stream, passing the admixture into a second zone containing oxidation catalyst maintained in indirect heat exchange relationship with the first zone to minimize heat loss from the first zone, and effecting in the second zone substantial oxidation of CO and HC from the exhaust gas stream. A major problem existed previously in connection with the removal of NOx which are produced in the engines and which generally pass on through the converter without conversion or removal.

44879 **APTIC NO. 68100**

Hashimoto, Sakahisa, Fumio Nozaki, and Takayoshi Uematsu

A BASIC STUDY ON TREATMENT OF GAS INCLUDING POISONOUS GAS SUCH AS SULFUROUS ACID

GAS,CARBON MONOXIDE AND NITRIC OXIDE. *(Aryusan gasu, issanka tanso, issanka chisso nado yugai gasu o fukumu kitai no shori ni kansuru kisoteki kenkyu). Text in Japanese. Chiba Daigaku Kankyo Kagaku Kenkyu Hokoku (Environ. Sci. Res. Rep., Chiba Univ.), 1(1):133-140, July 1973. 12 refs.*

Elimination of sulfur dioxide, carbon monoxide, and nitric oxide by oxidation or absorption with solid catalysts present was studied. In the current test investigations were made into a case in which sulfurous acid gas, CO, and NO were respectively treated at high concentration. The oxidizing reaction from SO2 to sulfur trioxide does not occur at a temperature below 50 C without moisture present. In an absorption followed by elimination of SO2 by activated carbons, the SO2 absorption heat is 5.2 kcal/mol, which is close to the evaporation heat. The oxidation reaction from CO to carbon dioxide was conducted by using various solid catalysts and uranium oxides showed a high activity among metal oxides belonging to n-type semiconductors. Alumina was effective as a carrier substance to increase the effective surface area of uranium oxides. Gas chromatography with silica gel columns is available for analysis of catalytic reactions of NO to molecular nitrogen.

44880 **APTIC NO. 65328**

Hoogendoorn, Jan C.

GAS FROM COAL WITH LURGI GASIFICATION AT SASOL. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 111-125. 8 refs. (Sept. 10-14.)*

Coal gasification using the Lurgi process is described as employed in the Sasol Fischer-Tropsch units in South Africa. All the raw gas made in the gasification plant goes through Rectisol purification and the purified gas is used to feed the two Fischer-Tropsch synthesis plants. The Synthol plant uses the entrained catalyst system whereas the Arge plant uses a fixed bed reactor system. Tailgas from the Arge plant goes to the pipeline system whereas a part of the tailgas from the Synthol units goes to a low-temperature separation plant where hydrogen and nitrogen are separated for production of synthetic ammonia. The methane in the tailgas, which is produced as a separate stream from the low-temperature separation unit, is also used for pipeline gas together with pure gas from Rectisol which has a heating value of 400 Btu/cu ft and the resulting gas mixture goes into the pipeline at a heating value of 50o Btu/cu ft. Some of the Synthol tailgas, not used for ammonia or pipeline gas, goes to a methane reforming plant where the methane in the tailgas is reformed by partial oxidation over a catalyst to hydrogen and carbon monoxide, which is recycled to the Synthol reactors. The system also contains a shift converter to correct the hydrogen balance which varies with the relative gas demand for the two Fischer-Tropsch plants and the ammonia synthesis. The Lurgi process can be operated with a high degree of reliability and commercial gas of great purity can be obtained.

44881 **APTIC NO. 65338**

Hoogendoorn, Jan C.

EXPERIENCE WITH FISCHER-TROPSCH SYNTHESIS AT SASOL. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 353-365. (Sept. 10-14.)*

Sasol operates fixed bed Fischer-Tropsch synthesis (Arge) and fluid bed synthesis systems (Synthol). Operating results, product properties, scope for further developments, and applications for synthesis of liquids and for synthesis of light hydrocarbons are reviewed. The Arge system uses a pelletized precipitated iron catalyst with promotors in a fixed bed tubular reactor system. The Synthol process uses a promoted iron catalyst powder in an entrained circulating bed. The present method of operation of the Synthol reactor is that a reactor is loaded with fresh, reduced catalyst and the reactor is started with normal synthesis gas but under moderate conditions to condition the catalyst. The Fischer-Tropsch reactions are exothermic and the heat produced is to a large extent used for steam raising and preheating of boiler feed water.

44882 **APTIC NO. 65309**

Johnson, Clarence A., Michael C. Chervenak, Edwin S. Johanson, Harold H. Stotler, Olaf Winter, and Ronald H. Wolk

PRESENT STATUS OF THE H-COAL PROCESS. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 549-575. (Sept. 10-14.)*

The present status of the H-Coal Process for the conversion of coal to liquid products is reported. The H-Coal Process utilizes an ebullated bed reactor to continuously convert coal in a catalytic hydrogenation system. Bench-scale and process development units are described briefly. Experimental results are presented for operations on two ranks of coal (Illinois No. 6 and Wyodak) and two modes of operation (synthetic crude and low-sulfur fuel oil production). The importance of solids separation is discussed and scale-up data presented. Schematic diagrams of two commercial plant concepts are shown. A new coal gasification process is proposed as the means to provide the required hydrogen for the H-Coal process. An economic summary is presented for three types of commercial plants and a prototype plant route to commercialization is described. (Author abstract)

44883 **APTIC NO. 65333**

Jones, John F.

PROJECT COED (CHAR-OIL-ENERGY DEVELOPMENT). *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 383-402. (Sept. 10-14.)*

The Char-Oil-Energy Development (COED) Process which converts coal to cleaner and more valuable products, synthetic crude oil, gas, and char is described. The gas from the process can be sold as fuel gas or converted by application of additional technology to pipeline gas or hydrogen. The residual char would be used as a power plant fuel or gasified, again through the application of further technology. Several years of bench-scale research and the operation of a 100 lb/hr process development led to the design, construction, and operation of a pilot plant which can process 36 tons of coal per day and hydrotreat 30 barrels of coal-derived oil per day. Significant accomplishments have been demonstrated in solid circulation between multiple fluidized bed reactors, the filtration of coal oil, and the upgrading of the coal oil to synthetic crude oil through fixed bed hydrotreating. In the COED process coal is crushed, dried and then heated to successively higher temperatures in a series of fluidized bed reactors. In each fluidized bed a fraction of the volatile matter of the coal is released. The temperature of each bed is selected to be just short of the maximum temperature to which the coal can be heated without agglomerating and defluidizing the bed. Typically, four stages operating at 600, 850, 1000, and 1500 F are used. The number of stages and the operating temperature varies with the agglomerating properties of the coal. Heat for the process is generated by burning char in the fourth stage to heat the other vessels. (Author abstract modified)

44884 **APTIC NO. 65452**

Kraus, Bernhard Josef and Dae Sik Kim

METHOD OF, AND APPARATUS FOR, REDUCING THE AMOUNT OF POLLUTANT FROM AN INTERNAL COMBUSTION ENGINE. *(Esso Research and Engineering Co., Linden, N. J.) Brit. Pat. 1,314,859. 7p., April 26, 1973. (Appl. Feb. 12, 1970, 16 claims).*

This invention relates to a method of, and apparatus for, reducing the amount of pollutant in the exhaust gas of a carbureted internal combustion engine, and to a low polluting internal combustion engine in which, during operation, the production of objectionable compounds such as nitrous oxides, carbon monoxide, and unburned hydrocarbons is minimized in the exhaust gas. The method comprises injecting a pulse of secondary air into the exhaust port being in the range of 10% to 30% by volume based on the total volume of exhaust gas discharged from each exhaust port. The rate of secondary air injection in each air pulse increases progressively to a maximum at the full opening of the exhaust valve and diminishes progressively as the exhaust valve closes. A preferred feature of this invention involves introduction of the recycle at a point between the throttle valve and the fuel inlet. Since the pressure at this point is usually near ambient, no special control valves are required to proportion the exhaust stream for recycle. In the conventional means of injection into the intake manifold, a special and complex valve must function to maintain proportional recycle against the widely varying pressure difference between exhaust and intake.

44885 **APTIC NO. 65321**

Krieb, K. H.

COMBINED GAS- AND STEAM-TURBINE PROCESS WITH LURGI COAL PRESSURE GASIFICATION. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 127-142. (Sept. 10-14.)*

Data on the construction and operation of the 170-MW KDV combined gas/steam turbine power plant are given, with comparisons to present coal-fired plants. The reason for developing this process and constructing this plant are: development of an antipollutant type of power plant; considerable improvement in efficiency; and reduction in investment costs. Process-engineering facts include: atmospheric combustion is replaced by pressure gasification; steam generation in a suction-furnace boiler is replaced by steam generation in a pressurized boiler; feedwater preheating occurs in the atmospheric range in both processes; conventional air heating at the boiler exit is replaced in the KDV process by air preheating in the compressor of the gas turbine; and the conventional dust-collecting and sulfur dioxide-desulfurization equipment in the atmospheric range are replaced by pressure scrubbing and pressure hydrogen sulfide-desulfurization. The KDV process uses H2S scrubbing desulfurization where not only a higher concentration of the noxious matter is present but also a product must be separated whose chemical treatment is easier. The object of the plant development is: to build a 400 or 800-MW combined unit with a pressurized boiler using one or two gas turbines and one reheated steam turbine; to double the unit capacity of the gasifier on the coal conversion plant side; to broaden the range of coal sizes and to use coal with pronounced caking characteristics, if possible; and to install an H2S desulfurization plant.

44886 **APTIC NO. 65433**

Kufrin, Frederick W., Paul R. Virnoche, Donald J. Allen, Phillip E. Gokey, and Frederick A. Rose

SEWAGE BURNER FOR INCINERATING TOILET WASTE. *(Nachverbrennungskammer fuer ein Verbrennungsklosett). Text in German. (Polar Ware Co., Sheboygan, Wis.) W. Ger. Pat. Appl. 2,166,256. 5p., May 30, 1973. 1 ref. (9 claims).*

The afterburner channel begins at the outlet opening on the front wall of the combustion chamber and opposite the burner, the extends at 90 degrees over the front wall and then rearward along one sidewall to an outlet. Vapors and volatiles driven off from solid material to be destroyed are heated to sufficient temperatures to destroy all smells. Electric control circuits regulate the heating cycle. A temperature of 540 C may be reached in the afterburner and there is a thermostat switch set at 510 C.

44887 **APTIC NO. 65362**

Laatsch, Fritz

INCINERATOR FOR INDUSTRIAL WASTE HAS AFTERBURNER CHAMBERS. *(Verbrennungsofen fuer Abfaelle, insbesondere Industrieabfaelle). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 2,164,663. 4p., July 5, 1973. 4 refs. (3 claims).*

Gas-tight partitions extend between the combustion chamber and the afterburner chamber(s); the outer channels open into the afterburner chamber(s) at 90 degrees to the direction of gas take-off from them, and are directed toward the flames of the additional burner. In succession upward, the chambers are followed by a trickle scrubber for the flue gases, and a chimney.

44888 **APTIC NO. 65337**

LaRosa, Paul and Ronald J. McGarvey

FUEL GAS FROM MOLTEN IRON COAL GASIFICATION (190-940 BTU/FT3). *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 285-300. 3 refs. (Sept. 10-14.)*

The development by the Applied Technology Corporation of several coal gasification processes to produce fuel gases with heating values ranging from 190 to 940 BTU/SCF is described. These processes are based on the molten iron gasification concept in which coal is injected with steam or air into a molten iron bath. Steam dissociation and thermal cracking of coal volatile matter generate hydrogen and carbon monoxide. The coal sulfur is captured by the iron and transferred to a lime slag from which elemental sulfur can be recovered as a by-product. The coal dissolved in the iron is removed by oxidation to carbon monoxide with oxygen or air injected near the molten iron surface. Three processes are discussed: the Two-Stage Coal Combustion Process which uses coal/air to yield a 190 BTU/SCF offgas; and the PATGAS and ATGAS Processes which use coal/steam/oxygen to yield product gases with heating values of 315 and 940 BTU/SCF, respectively. The main advantages of molten iron coal gasification are its low pressure operation and its complete flexibility regarding coal properties. This method uses crushed (minus 1/8 inch) coal regardless of sulfur content, caking, or fines generation tendencies. All of the coal is gasified and there are no char or fines by-products to be marketed. Capital investments are 28, 85-112, and 202 $MM for the two-stage, PATGAS, and ATGAS Processes, respectively, based on a gas BTU output equivalent of a 250 MMSCFD SNG plant. Using the standard gas industry price estimating method, the estimated 20-year average price of gas ranged from $0.35 (Two-Stage, 190 BTU/SCF) to $1.10/MMBTU (ATGAS, 940 BTU/SCF) when coal is available at $0.30/MMBTU. (Author abstract)

44889 **APTIC NO. 65331**

Lee, Anthony L.

METHANATION FOR COAL GASIFICATION. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 341-351. 11 refs. (Sept. 10-14.)*

The critical steps in a mathematical model for the methanation process for coal gasification, and evaluation of commercially available catalysts are presented. The activity of the catalyst is determined at a given temperature, pressure, flow rate or space velocity, and a feed composition simulating actual plant conditions. This activity is compared with that of other catalysts at the same conditions. The upper and lower temperature limits are determined. This will define the range in which the catalyst remains active so that the reactor may be designed accordingly. The catalyst is tested for thermal resistance at its upper temperature limit. The catalyst is kept hot for at least three days, then it is brought back to its original condition. If deactivation occurs, each experimental run is conducted for 36 hr or more so that its deactivation behavior can be studied. The activity is studied in the presence of benzene, ammonia, or any other foreign material that may be in the feed gas to the methanation reactor. The effect of pressure on the rate is studied for the entire pressure range. The kinetics of the catalyst are studied for the temperature range. If the catalyst manufacturer claims that his catalyst is sulfur-resistant, its sulfur tolerance will be tested. If the catalyst passes all the tests, a life test is conducted for 1000 hours or more. Two types of reactors were selected for the study. One is the conventional packed bed reactor which was to be used to study the carbon deposition, process variables such as temperature distribution, temperature profile, the effect of poisoning, and life test. The second reactor is a continuous-stirred-tank-reactor (CSTR). It is a reactor in which the contents are thoroughly stirred so that the composition and temperature of the fluid are uniform throughout.

44890 **APTIC NO. 65326**

Loeding, John W. and Constantine L. Tsaros

IGT U-GAS TM (CLEAN UTILITY GAS) PROCESS. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 241-271. 4 refs. (Sept. 10-14.)*

The U-Gas Process is described as producing a fuel of low heating value on the order of 140 Btu/SCF (wet basis). The low heating value of gas restricts the distance it can be transported economically. When used to fuel electric power stations, it probably will be generated on site. Retrofitting coal gasifiers to existing boilers is one of the most important applications now for U-GAS plants. Guiding principles concerning design of the demonstration plant for conversion of coal to clean utility gas in the U-Gas process are intended to: prove the gasifier design and operation; accept caking and high-sulfur coal as feed; demonstrate application of coal gasification to existing boilers; and build a gasifier large enough so that it can be directly scaled to commercial size. The U-GAS Process offers an economic solution to the use of high-sulfur content coal at utility plants without polluting the environment. The process can use for feed all ranks of coal, as well as lignite. Simple reactor design with high throughput due to a fluid bed, high carbon conversion, and elimination of the need for an oxygen plant will result in low investment and operating costs. A ten-to-one turndown capability will provide excellent load-following characteristics, making the process ideal for direct coupling to conventional power generating systems. In addition to use in the retrofit of present plants, the U-GAS Process is suitable for use in new plants that supply clean low-Btu gas for large industrial users that desire a degree of self-sufficiency in power generation, and for use in combined-cycle steam-electric power generation. Among the processes under consideration for purification of the gas in the U-Gas Process is the IGT Meissner Process which removes sulfur and particulates at high temperature and pressure. (Author introduction modified)

44891 **APTIC NO. 65276**

Lovett, William D. and Frank T. Cunniff

ACTIVATED CARBON METHODS FOR CONTROLLING STATIONARY SOURCE AIR POLLUTANTS. *Preprint, American Inst. of Chemical Engineers, New York, 8p., 1973. 13 refs. (Presented at the American Institute of Chemical Engineers, Annual Meeting, 66th, Philadelphia, Pa., Nov. 11-15, 1973.)*

The control of stationary source emissions using new carbon-based adsorption products and novel system approaches is discussed. New products discussed include carbon supported catalysts and chemically impregnated carbons. Several unique systems employing activated carbon as a concentrator are reviewed. Activated carbon can be used for a multiplicity of applications in a full range of contaminant concentrations from low ppm to 40% v/v. Although some of the processes are still in the pilot plant stage, most are fully developed and currently in use in the U. S., Canada, and Europe. By concentrating emission streams, activated carbon can be used to produce fuels suitable for incineration. This should lead to increased air pollution control with reduced energy drain. Should air pollution codes become more stringent, activated carbon systems will not become obsolete. Simple changes in operational parameters will maintain or increase system efficiency. For example, if increased pollutant removal efficiency is needed, additional carbon capacity can be obtained by decreasing cycle times and/or adsorption temperature. This can be accomplished without the need for additional equipment. (Author summary modified)

44892 **APTIC NO. 65438**

Maeda, Hidenori, Yujiro Matsui, Tsukasa Ikeda, and Eikichi Mohri

WASTE GAS COLLECTION SYSTEM FOR COPPER CONVERTER. *(Abgassammler fuer einen metallurgischen Konverter). Text in German. (Taisei Kensetsu K.K. and Dowa Kogyo K.K., Tokyo (Japan)) W. Ger. Pat. Appl. 2,309,542. 6p., Oct. 18, 1973. 1 ref. (2 claims).*

An exhaust gas collector for a metallurgical converter for blowing copper matte has a chamber surrounding the converter vessel and having a charging opening which can be closed by a movable lid, which forms a body with a sickel - shaped bounded cross section to seal the opening, in the blowing position of the converter, such that the curved inner wall of the lid abuts the suction hood with its back edge, the chamber wall with its curved outer wall, and the converter jacket, or the skirt which surrounds it concentrically, sealing it with its front edge. The lid can be moved on a curved path which corresponds to the curve of the lid s inner wall, into a position b in which the converter is released for movement into other working positions B, C, D. The lid s curved outer wall remains, as the lid moves, in sealing contact with the chamber wall and the lid can be moved for charging the converter into a position c in which the charging opening is freed.

44893 **APTIC NO. 65696**

Maeda, Yukimi

IMPORTANCE OF THE DEVELOPMENT OF THE METHODS TO REMOVE NITROGEN OXIDES. *(Dassho-gijutsu kenkyu kaihatsu no suishin). Text in Japanese. Netsu kanri to Kogai (Heat Management Public Nuisance), 25(12):39-44, Dec. 1973.*

Various nitrogen oxides, especially nitric oxide and nitrogen dioxide, are toxic to humans by themselves and also cause photochemical oxidants. Legal regulations are being set up in Japan, but a number of problems remain to be solved before nitrogen oxides are eliminated. At present, nitrogen oxides are either removed by an improvement in the method of combustion or by the treatment of the gas discharged after combustion. Most hazardous is the gas discharged from power generators, which contain 275- 300 ppm NOx. As much as 233,000-804,000 N cu m of exhaust gas is discharged per hour from a boiler for power generators. The elimination of NOx by process modification is difficult in combustion facilities other than biolers. For example, the lowering of the combustion temperature, which is effective for the reduction of NOx concentration, cannot be applied to sintering furnaces and coke furnaces. Therefore, NOx has to be eliminated by the treatment of discharged gases. It is very difficult to treat NOx, especially nitric oxide, because they are not soluble in water. Catalysts, used for the decomposition of NOx, are often poisoned by various substances present in discharged gases. Various financial aids are being palnned by the Government for the development of NOx removal techniques.

44894 **APTIC NO. 65476**

Mel nik, P. M., V. I. Vatamanyuk, S. S. Lisnyak, O. Z. Podlesnyak, and V. A. Kal mutskaya

USE OF HYDROGEN CHLORIDE FROM EXHAUST GAS FOR PRODUCTION OF CHLORINE. *Sov. Chem. Ind. (English translation from Russian of Khim. Prom.), 5(4):253-255, April 1973. 21 refs.*

The problem of using hydrogen chloride, isolated in the chlorination of organic compounds and in a number of other technological processes, has acquired great importance. The presence of various impurities in the HCl works against its use in synthesis of chlorine-containing products. One of the most promising techniques for reuse of the HCl-containing waste gas is processing it into chlorine by electrochemical or chemical (catalytic) means, based on the Deacon process. An experimental study was carried out to find a highly active, stable catalyst for oxidizing the exhaust gas HCl and to then use the chlorine to produce sodium hypochlorite. In the initial period, 81% of the HCl was converted to chlorine; then the conversion fell to 66% because of a significant increase in the HCl concentration in the exhaust gas. Increase in the HCl content in the exhaust gas led to decrease in the degree of conversion. At the exit from the contact, the gas contained 10-14% chlorine. The gas was then passed through a 20-30% solution of sodium hydroxide to produce sodium hypochlorite.

44895 **APTIC NO. 65323**

Moe, James M.

SNG FROM COAL VIA THE LURGI GASIFICATION PROCESS. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 91-110. 1 ref. (Sept. 10-14.)*

The sequence of processes used to manufacture 250 MM SCFD of SNG (substitute natural gas) is described. Material blanaces are given and capital and operating costs are presented. The Lurgi gasifier reacts coal with steam and oxygen in a slowly moving bed. The process is semi-continuous. The methanation process is an extrapolation from current commercial units and, although it does not present any engineering problems, has required some catalyst development programs. The catalyst development work is being carried out in a number of laboratories and pilot plants. The plant incorporates extensive use of air for cooling needs, and extensive reuse of treated effluent water. The stack gas emissions of sulfur will be 7.46 tons/day. The stack gas emissions of particulates will be 1.77 tons/day from steam plant stacks, and 51 lbs/day from steam superheater stack.

44896 **APTIC NO. 65653**

Ogasawara, Mitsunobu, Toshimi Takagi, and Kenichi Fujii

BASIC STUDIES ON FORMATION OF NITROGEN MONOXIDE AND CARBON MONOXIDE IN COMBUSTION GAS AND THEIR REDUCTION METHODS (2ND REPORT, CALCULATED RESULTS OF VOLUME OF NITROGEN MONOXIDE FORMATION AND SOME REDUCTION METHODS). *(Nenshogasuchu no NO oyobi CO no seisei to sono teigenho ni kansuru kisoteki kenkyu (Dai 2-ho, NO no seiseiryo to ikutsukano teigenho ni tsuiteno keisan kekka)). Text in Japanese. Nippon Kikai Gakkai Ronbunshu (Trans. Japan. Soc. Mech. Engrs.), 39(327):3427-3433, Nov. 1973. 15 refs.*

The effects on the quantity and the velocity of formation of nitric oxide of reaction temperature, pressure, equivalence ratio, type of fuel, and pre-heating temperature were investigated. Quantitative calculations were also made to determine the relative efficiencies of three NO reduction methods; exhaust gas recirculation, water injection, and two-stage combustion. The equilibrium concentration value and NO formation velocity increase with higher temperature. At 1700 K or lower the formation velocity is so slow that it indicates a practical possibility of reducing NO by low combustion temperature. With the temperature kept constant, the leaner the fuel the greater the equilibrium concentration value and the formation velocity. The equilibrium concentration value is lower with higher pressure but the formation velocity is greater. Type of fuel (hydrocarbon) has no effect if the temperature remains the same. However, since the combustion gas temperature varies with type of fuel, both the equilibrium concentration value and the NO formation velocity differ accordingly. The NO reduction effect of the exhaust gas recirculation system and the water injection system is caused by the decrease in the flame temperature. In the realm where equilibrium is yet to be reached, the reduction efficiency is greater than estimated from the equilibrium concentration value. In the two-stage combustion system, the NO reduction effect is greater when the temperature drop in the first combustion stage is greater.

44897 **APTIC NO. 65415**

Palmork, Karsten H.

POLYCYCLIC AROMATIC HYDROCARBONS IN MARINE ENVIRONMENT. *(Polysykliske aromatiske hydrokarboner i det marine miljo). Text in Norwegian. Nionde Nord. Symp. Vattenforskning, 9th, Fjorder Kystvann Resipienter, Trondheim, Norway, 1973, Nordforsk Miljovardssekretariatet, Rept. 4, p. 99-125, June 1973. 12 refs. (June 27-29.)*

Analyses of seawater and benthic sediment samples for aromatic polycyclic hydrocarbons are described, and possible sources of these contaminants are discussed. Sludges from waste water treatment plants released in the ocean are among the causes of seawater contamination by polycyclic aromatic hydrocarbons. Sludge from waste gas scrubbers used in an aluminum works for the separation of dust and other particulate matter originating partly from the electrode material containing aromatic polycylic hydrocarbons contained 240 mg anthracene plus phenanthrene, 250 mg fluoranthene and 220 mg pyrene/kg dry weight. Such scrubbers retain about 50% of all polycyclic aromatic hydrocarbons with the rest being emitted to the atmosphere.

44898 **APTIC NO. 65396**

Pedersen, Bjarne

EXHAUST GAS TREATMENT SYSTEM FOR AN INTERNAL COMBUSTION ENGINE. *(Assignee not given.) Brit. Pat. 1,313,355. 6p., April 11, 1973. (Appl. Oct. 9, 1970, 11 claims).*

This invention relates to an exhaust gas treatment system for an internal combustion engine for preventing noxious exhaust products from escaping into the atmosphere. Other techniques which have been proposed create a substantial back pressure which interferes with the smooth running of the engine. The system comprises a gas reactor with a gas inlet connected to the exhaust and a gas outlet, air delivery means connected to the reactor for delivering air thereto, gas deflector means for imparting a turbulent movement to gas flowing through the reactor and comprising a plurality of tubes extending through the reactor, and means connected to the tubes for producing a continuous circulation of cooling fluid therethrough, arranged so that, in use, exhaust gases and air are mixed in the reactor, carbon monoxide and unburned hydrocarbons in the exhaust gases/air mixture are burned, and the products of combustion leave the reactor by the outlet.

44899 **APTIC NO. 65312**

Phinney, John A.

CLEAN FUELS VIA THE CSF PROCESS. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 525-538. (Sept. 10-14.)*

The Consol Synthetic Fuel Process for the conversion of coals to clean fuels is presented. It is a combination of extraction and extract hydrogenation performed in the manner best suited to fit the properties of the feed coal and the desired product specifications. Lurgi briquetting and gasification is used in the process in which the residue from extraction is utilized to generate the necessary hydrogen for the process. A donor solvent provides most of the hydrogen in the extraction step. In practice, the conditions for process operation would be tailored to fit the coal feed and the desired end product. For coals of greater organic sulfur content or for products of lower sulfur content, at least a portion of the extract would be hydrocracked. Hydrocracking severity would be dictated by desired end product specifications. The conditions of extraction would then be chosen to provide sufficient residue to generate the necessary hydrogen.

44900 **APTIC NO. 65314**

Podall, Harold E.

REVIEW OF OFFICE OF COAL RESEARCH PROGRAM AND SOME RESEARCH PROBLEMS. *Inst. of Gas*

Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 663-671. (Sept. 10-14.)

The Office of Coal Research program is reviewed and some areas of research indicated. The topics reviewed are: research and development of improved mining methods for large scale operations; stack gas cleanup of emissions (flyash, sulfur dioxide, nitrogen oxides) from existing coal-burning power plants; clean combustion processes; refining of coal to a higher grade, clean solid fuel; conversion of coal or refined coal to a hot, low to medium Btu fuel gas for use in power plants; advanced combustion/combined power cycles; conversion of coal to transportable forms of energy, including pipeline quality gas and clean liquid fuels; multi-product plants and coal refinery complexes; and conversion of coal or coal-derived intermediates to other unconventional fuels, involving methanol, Fischer-Tropsch hydrocarbons, and hydrogen. Coal offers one of the best long range, as well as short range, solutions to the energy problem, environmental factors considered. (Author abstract)

44901 **APTIC NO. 65332**

Quade, R. N. and A. T. McMain

NUCLEAR ENERGY FOR COAL GASIFICATION. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 403-431. 10 refs. (Sept. 10-14.)*

The high-temperature gas-cooled reactor (HTGR) developed for commercial application in the electric power generation field is described. Since the HTGR is capable of delivering heat in the 1000 to 2000 F range to adequately isolated process fluid streams, it has many applications that would not be possible at the lower operating temperatures of water-cooled reactors. Modifications to the reactor that enable it to be used as a process heat source are discussed. Specific applications are developed for coal gasification, coal liquefaction, and hydrogen production. The potential for the high range of reactor outlet temperatures and overall uranium resources are discussed. (Author abstract modified)

44902 **APTIC NO. 65751**

Ritscher, Guenter, Peter Hartig, and Reinhard Birr

FUNDAMENTALS OF CALCULATION FOR WET DUST COLLECTION METHODS. *(Berechnungsgrundlagen fuer Nassstaubabscheideverfahren). Text in German. Preprint, Technische Hochschule fuer Chemie Carl Schorlemmer Leuna-Merseburg (Germany), Sektion Verfahrenstechnik, Wissenschaftsbereich Anlagentechnik, 11p., 1973. 1 ref. (Presented at the Verfahrenstechnische Jahrestagung, Halle, East Germany, June 27-28, 1973.)*

Present characteristic curves and diagrams concerning the collection efficiency, energy demand, and influential parameters of the wet dust collection process are valid only for individual cases of application. The reason for this lies in the fact that, although all wet dust collection processes follow the same principle, namely the adherence of dust particles to a fluid, the collection process is strongly influenced by the design of the collector. For the impaction of the dust particles on the fluid droplets, a mathematical relationship has been developed. Bruchhaeuser checked the theory by Barth on a venturi scrubber. The connection between energy demand and collection efficiency could be confirmed. Taking into consideration the total droplet number per cu m scrubbing fluid, an equation for the theoretical cleaning efficiency is obtained. For agreement of the theoretical values with the measured results, a correction factor had to be introduced taking into account all influencing factors which Barth s model neglected (uniform dust and fluid distribution, idealized droplet form, idealized form, and distribution of the dust particles). By introducing the contact energy, Semrau developed an empirical method for the advance calculation of the collection efficiency. The contact power is the energy consumed by turbulence in the gas-fluid mixture. Individual processes and constructional design of the collectors are not taken into account. For special types of packed and spray towers, venturi scrubbers, and for foam scrubbers equations were developed. An important method for the selection of wet collectors has been suggested. Based on studies of 25 scrubbers, a grouping by the operating properties and collection efficiencies was undertaken. Knowledge of the limit grain size and the grain size distribution permits determination of the anticipated collection efficiency.

44903 **APTIC NO. 65437**

Santiago, Andres

CATALYTIC EXHAUST GAS PURIFIER WITH OPTIONAL BYPASS. *(Vorrichtung zum Entgiften der Abgase von Brennkraftmaschinen). Text in German. (Zeuna-Staerker KG, Augsburg (Germany)) W. Ger. Pat. Appl. 2,222,664. 3p., Nov. 22, 1973. 5 refs. (3 claims).*

The first catalytic agent encircles a perforated inlet pipe which has impermeable walls beyond this first agent in the direction of gas flow. In this region the pipe passes through the center of the second catalytic agent and is separated radially from it. The end of the pipe has a sealing flap and is connected to the outlet nozzle. The annular outlet chambers are bounded radially by the housing. The intermediate chamber between the two catalytic agents is axially bounded by the two immediately adjoining faces of the catalytic agents. When the flap is open, the complete exhaust gas flow passes through the inner tube without passing through the catalytic agents. This procedure is adopted when it is necessary to operate the engine at exceptionally increased power output.

44904 **APTIC NO. 65495**

Sarto, Jorma Olavi

IMPROVEMENTS IN OR RELATING TO INTERNAL COMBUSTION ENGINE EXHAUST GAS RECIRCULATION. *(Chrysler Corp., Highland Park, Mich.) Brit. Pat. 1,335,487. 9p., Oct. 31, 1973. (Appl. Nov. 22, 1971, 14 claims).*

This invention relates to the recirculation of exhaust gases to the inlet header in an internal combustion engine. An inlet header conducta a fuel-air inlet mixture into the engine for combustion therein, and an exhaust header discharges the hot combustion products from the engine. A wall portion comprises a hot spot exposed to the flow of the fuel air mixture in the inlet header for heating the mixture during operation of the engine. Means for reducing the formation of oxides of nitrogen during the combustion by limiting the combustion temperature comprise a recylcing duct for conducting hot exhaust gases from the exhaust header into the inlet header. The recycling duct extends through the hot spot in heat transfer relationship to facilitate its heating. It has one end opening into the exhaust header at a location exposed to the hot exhaust gases within the exhaust header during use of the engine, a second end opening into the inlet header, and a restriction in the recycling duct adjacent the opening of the one end into the hot gases and spaced from the hot spot sufficiently to reduce heat loss thereto from the restriction for obtaining a temperature at the latter above the precipitation temperature of lead contaminants in the exhaust gases during engine use. Prior structures have not been commercially acceptable from the standpoints of both cost and operating efficiency and are complicated by the desirability of reducing the recycling during conditions of both engine idling when nitrogen oxide emission is a minor problem and wide open throttle when maximum power is required, while progressively increasing the recycling of exhaust gases with increasing engine speed during cruising or with increasing engine load at part open throttle.

44905 **APTIC NO. 65041**

Scheers, A. H.

SAFETY SYSTEMS AND AIR POLLUTION. PART 11. *(Veiligheidssystemen en luchtverontriniging). Polytech. Tidschr., Ed. Procestechniek (The Hague), 1973:529-534, Aug. 8, 1973. Translated from Dutch, 17 p.*

The choice of safety systems depends on the resistance in the system which increases gradually from the flare stack outlet and is greatest behind the valve. This maximum pressure is called the back pressure of the valve. Safety devices can be chosen from two main types: the nonbalanced valves and the balanced valves. Methods to calculate the resistance in flare pipelines are discussed. The special problems in calculating gas pipelines due to the variable gas density during transport and a few current calculation methods are also discussed. A general and very effective calculation method is derived. Some design aspects are reviewed, and the practical procedure is illustrated with a simple pipeline system.

44906 **APTIC NO. 65042**

Scheers, A. H.

SAFETY SYSTEMS AND AIR POLLUTION. PART 9. *Polytech. Tidschr., Ed. Procestechniek (The Hague), 1973:463-468, Oct. 7, 1973. Translated from Dutch, 15p.*

One of the most important items for a flare is the safety aspect. The danger of flame inversion develops when the gas supply to the flare stagnates. Ways to safeguard against flame inversion include the possibility of gas purging, arresting of the flame, mechanical seals, sealing by means of the molar difference of gases, and the important water seal vessel. These safety measures are reviewed, and theoretical aspects are discussed.

44907 **APTIC NO. 65059**

Scheers, A. H.

SAFETY SYSTEMS AND AIR POLLUTION. PART 12. *(Veiligheidssystemen en luchtverontreiniging). Polytech. Tijdschr., Ed. Procestechniek (The Hague), 1973:553-556, Aug. 22, 1973. Translated from Dutch, 10p.*

The requirements which must be established for safety devices for flares, their inlet pipes, and the determination of the maximum blow-off quantities are discussed. The mixing of different types of gases is reviewed to determine the average gas magnitudes needed for the calculation of the system. The safety devices are needed to protect an installation against a higher pressure than that for which it has been built. The safety device must be protected against corrosion and have valves to discharge or by-pass gases. The maximum flow intensity for safety devices, the average motor masses, and the temperatures can be determined theoretically.

44908 **APTIC NO. 65324**

Schora, Frank C.

TECHNICAL AND HISTORICAL BACKGROUND. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 43-48. (Sept. 10-14.)*

The historical and technical background of conversion techniques of coal to a liquid or gas is presented. Rank, composition, and characteristics of the coal will effect efficiency of conversion and economics only, although conversion techniques in their optimum form may vary depending on the coal type. Whether coal is converted to a liquid or a gas depends on processing and severity of processing. Four routes are possible: pyrolysis, which produces a co-product, gas and liquid; solvation, which produces a liquid that can be further upgraded by hydrogenation; hydrogenation, either catalytic, which produces mostly liquid, or noncatalytic, which is destructive, producing mostly methane; and synthetic gas, which with subsequent treatment of gas will yield either methane or liquids, depending on the catalyst used. Coal, char, and gaseous reactions are presented. Production of liquids and gaseous coals from coal is discussed from chemical and technological standpoints. Major problems to be faced in all processes are feeding solids, removing ash, control of solids movement, and materials of construction.

44909 **APTIC NO. 65327**

Schora, Frank, Jr., Bernard S. Lee, and Jack Huebler

THE HYGAS PROCESS. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 219-240. (Sept. 10-14.)*

The HYGAS coal gasification process used for the generation of high-heating-value gas suitable for injection into pipeline systems is discussed. Overall process thermal efficiency is improved by maximizing direct methane formation. The conversion efficiency is over 70%. The process uses hydrogen and steam in hydrogasification. Although the HYGAS system contains means for eventually being capable of operating directly with raw, caking coals, a pretreatment step is currently provided. A facility has been constructed having a capability for producing 1.5 million cubic feet of pipeline-quality gas daily. This pilot plant is now being employed to develop the information necessary for the successful design of a commercial-sized facility.

44910 **APTIC NO. 65467**

Schwab, Guenther, Joachim Buxmann, and Walter Hermann

BOILER FLUE DUST SEPARATOR. *(Vorrichtung zum Abscheiden von Festteilchen aus Rauchgasen einer Feuerungsanlage, insbesondere eines Dampferzeugers). Text in German. (Maschinenfabrik Augsburg-Nuernberg AG, Augsburg (Germany)) W. Ger. Pat. Appl. 2,140,167. 5p., March 1, 1973. 2 refs. (3 claims).*

A flue dust separator for coal fired installations uses the principle of momentum to trap dust particles when the main stream is diverted through 90 degrees or more. Vanes, at 45 degrees, are set in the wall of the flue opposite the incoming stream and pockets collect the dust into a dust-rich substream. Lower down the cross-section of the subduct is reduced by further vanes set at 45 degrees across the duct and dust particles are further separated into the side stream, this having an enriching effect while surplus gas returns to the main stream. The side stream contains only about 1% of the gas in the main stream and can be returned further down, after the dust has been removed, for heat recovery purposes.

44911 **APTIC NO. 65480**

Sevian, W. A., F. J. Salzano, and K. C. Hoffman

ANALYSIS OF HYDROGEN ENERGY SYSTEMS REPORT TO SUBGROUP ON SYNTHETIC FUELS OFFICE OF SCIENCE AND TECHNOLOGY. *Brookhaven National Lab., Upton, N. Y., Associated Universities, Inc., Atomic Energy Commission Contract At(30-1)-16, Nonnuclear Energy Sources and Energy Conversion Devices TID-4500, 66p., Feb. 1973. 8 refs.*

NTIS: BNL 50393

The use of hydrogen as an alternate fuel source is discussed, including its effect on engine exhausts. If H2 is used as a vehicle fuel, there will be a significant shift in emissions away from transportation and toward central station electric sites. The impact of emissions from central sources on ambient air quality is less than the impact from many distributed sources, and the central station plants are more amenable to improved pollution control technologies. The only significant H2 combustion emission is nitrogen oxides, and it is assumed that a H2-fueled engine would satisfy the 1976 Environmental Protection Agency NOx gasoline requirement. Assuming diesel utilization, implementation of H2 in the diesel-fueled transportation section would reduce emissions by the following percentages: carbon dioxide, 22%; carbon monoxide, 30%; sulfur dioxide, 44%; NOx, 78%; particulates, 11%; hydrocarbons, 14%; and aldehydes, 34%. Nitrogen oxides emissions from hydrogen-fueled engines will be sufficiently amenable to control to be able to meet EPA standards.

44912 **APTIC NO. 65329**

Squires, Arthur M.

THE COALPLEX: GAS, GASOLINE, AND CLEAN ELECTRICITY FROM COAL. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 485-524. 78 refs. (Sept. 10-14.) (Presented at the American Institute of Chemical Engineers, Annual Meeting, 65th, New York, Nov. 26-30, 1972.)*

The goals of research in techniques for gasifying coal are explored. Advances in technology involve processes for making power gas from coal to allow the extraction of fuel products of greater value. The reaction of coal with hydrogen with both rapid heating and control of vapor product residence time is investigated. A wide range of temperature, pressure, time, and coal type will be explored. Fluidized-bed techniques provide the best approach to production of power gas from coal or coke, and kinetic studies of fluidized-bed gasification are planned. Experimental studies are planned in four interrelated areas: the fast fluidized bed; agglomerating fluidized beds; hydrocarbonization of coal at short gas residence times; and carbon gasification kinetics in a fluidized bed. Flowsheet studies are planned to explore advantageous combinations of process steps for the Coalplex. The studies will be guided by system studies to examine how best a Coalplex might serve an electricity grid.

44913 **APTIC NO. 65311**

Strasser, John D.

GENERAL FACILITIES OFFSITE, AND UTILITIES FOR COAL GASIFICATION PLANTS. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 639-652. (Sept. 10-14.)*

The General Facilities Offsite and Utility Units of a Lurgi Coal Gasification Plant are discussed. The preparation of coal is outlined as to equipment, costs, and time requirements. Restoration plans for the land are a major consideration. Roads, buildings, and utility systems are discussed. Topics covered include water, raw water, steam and condensate systems, air systems, oxygen plant, nitrogen system, ammonia disposal, power generation and electrical system, coal and ash handling and dust control, sulfur recovery and storage, stacks and flares, holding ponds, process water effluent treatment, and tankage.

44914 **APTIC NO. 65435**

Tippmer, Kurt and Dieter Laufhuette

COKING PLANT GAS WASHING. *(Ammoniak-Schwefelwasserstoff- Kreislaufwaschverfahren fuer Kokereirohgase). Text in German. (Fa. Carl Still, Recklinghausen (Germany)) W. Ger. Pat. Appl. 2,058,709. 6p., June 20, 1973. (7 claims).*

Coke gas is washed to remove ammonia and hydrogen sulfide. There are two cycles between the H2S wash column and the de-acidifier column. In both cycles and NH3 (and H2S) solution passes from the base of the H2S wash column to the top of the de-acidifier and NH3 returns from the foot of the de-acidifier to the H2S washer. In the first cycle the NH3 is cooled and returned to the middle of the H2S washer. In the second cycle hot NH3 goes to the point higher up the H2S washer.

44915 **APTIC NO. 65277**

Tucker, J. R. and F. C. Alley

THE REDUCTION OF NITRIC OXIDE ON ACTIVATED CARBON AT ELEVATED TEMPERATURES. *Preprint, EEE, Inc., Ashland, Va. and Clemson Univ., S. C. Dept. of Chemical Engineering, 11p., 1973 (?). 10 refs.*

A method to reduce nitric oxide on activated carbon at elevated temperatures was studied experimentally. The reduction of NO at the temperatures studied and in the absence of reducing agents or oxygen was first order with respect to NO concentration with an activation energy of 32.1 kcal/g mole. Although the presence of carbon monoxide and hydrocarbons increased the rate of NO conversion, hydrogen had a much larger effect than other reducing agents normally found in the combustion gas exhaust. The presence of oxygen caused a large increase in the apparent rate of NO conversion, and this was attributed to a local temperature increase at the surface of the carbon due to the oxygen-carbon reaction. Carbon consumption was primarily a function of oxygen concentration, the presence of water vapor, and temperature, and these variables would be important considerations in the application of the process to various combustion gases. (Author conclusions modified)

44916 **APTIC NO. 65315**

Waterman, W. W.

SUMMARY PRESENTATION: AN OVERVIEW OF COAL CONVERSION TECHNOLOGY. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 673-684. (Sept. 10-14.)*

An overview is presented of the various processes developed for producing clean fuels from coal. Conversion processes are segregated under the broad categories of gasification, pyrolysis, and hydrogenation. The gasification methods may be further classified as single-stage processes, two (or multiple)-stage processes, and special processes. Some important differences in the coal conversion processes may be categorized as follows: differences in basic modes of attack; differences in products, process objectives, and areas of utility or application; differences in performance or efficiency; differences in development status or levels of commercialization; and differences in economic factors.

44917 **APTIC NO. 65364**

Winsel, August and Gerhard Lander

CATALYST FOR DETOXICATION EXHAUST GASES. *(Vorrichtung zur Entgiftung der Abgase von Kraftfahrzeug-Verbrennungsmotoren). Text in German. (Varta Batterie AG, Hannover (Germany)) W. Ger. Pat. Appl. 2,139,744. 2p., April 19, 1973. 1 ref. (2 claims).*

The exhaust system of an internal combustion engine contains a catalyst bed arranged parallel to the gas stream. The catalyst is Raney-Nickel supported on a metal carrier. The catalyst is obtained by hot or cold pressing or sintering of Raney-Ni or Raney-Ni alloy with a powdered metal.

44918 **APTIC NO. 65330**

Woebcke, Herman N.

HYDROGASIFICATION OF COAL LIQUIDS. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 433-446. (Sept. 10-14.)*

The Stone and Webster Gasification Process is described as employing the stepwise addition of hydrogen to coal in such a way that high carbon and hydrogen conversions are achieved. The advantages of the process derive from three separate considerations. First, coal is solubilized as a preliminary step to the processing sequence. Second, the liquefied coal is converted to clean fuels by hydrogasification, and third, in its preferred embodiment, the heat required for the entire process is supplied by a nuclear heat source, Gulf s HTGR, leading to the conversion of 57 to 70% of the carbon in the coal to clean, high heating value fuels. This high carbon conversion efficiency is obtained at costs estimated to be competitive with other processes. (Author abstract modified)

44919 **APTIC NO. 65310**

Yavorsky, Paul M.

SYNTHOIL PROCESS CONVERTS COAL INTO CLEAN FUEL OIL. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 539-547. 6 refs. (Sept. 10-14.)*

The Synthoil Process for converting coal into nonpolluting fuel oil with very low sulfur and ash contents is described. Coal conveyed in recycle oil is propelled by rapid, turbulent flow of hydrogen through a reactor packed with immobilized (fixed-bed) catalyst pellets. The combined effect of the hydrogen, turbulence, and catalyst is to liquefy and desulfurize the coal at high yields and high throughput. Sulfur is removed as H2S which is easily converted into inert elemental sulfur for industry or storage. Five coals of different grades have been successfully processed in a small 5 lb/hr pilot plant, demonstrating the broad applicability of the process. The product oils satisfy air-quality standards that translate to a maximum limit of 0.7% sulfur in such fuels; in fact, all the product oils had only 0.3% or less sulfur, even from coals having almost 5% sulfur. Most of the solid ash-forming materials can be removed by physical separation from the product oil for additional benefits to power plant operations or use in diesel engines or direct-fired turbines. A 1/2 TPD pilot plant, with output of 1.5 bbl/day of oil has just been started up. This process would enable abundant high-sulfur coals that are near the markets but presently barred from use in electric power plants by sulfur-limiting air-quality standards to reenter the utility fuel market and help relieve the well-recognized shortage of clean energy sources. (Author abstract modified)

44920 APTIC NO. 65318

Yavorsky, Paul M.

THE HYDRANE PROCESS. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 209-218. 3 refs. (Sept. 10-14.)*

A process for the direct conversion of coal to pipeline gas is described. The Hydrane process is distinct from other processes for producing methane because it is based upon the reaction of raw unpretreated coal with hydrogen to form methane directly, rather than the indirect schemes that form large portions of synthesis gas which requires extensive methanation. The other processes also require pretreatment of coal to prevent its agglomeration in their reactors. The Hydrane scheme is based on two hydrogasification reaction zones; raw coal first reacts with hydrogen in a free-fall zone where the dilute-phase particle dispersion avoids agglomeration of coal while plastic, and the resultant intermediate char, next reacts further with hydrogen in a fluidized bed. The process hydrogen is made in a separate reactor by steam-oxygen gasification of the residual char from the fluidized bed. Hydrogasification data have been obtained for the dilute and concentrated solids phases operated separately. Now, a 10 lb/hr integrated pilot plant with simultaneous operation of the dilute phase and fluidized-bed zones is being operated. Scale-up to a 24 TPD pilot plant is planned. The direct Hydrane process offers many economic advantages over the indirect routes. (Author abstract)

44921 APTIC NO. 65020

THE REMOVAL OF TAR-TYPE SUBSTANCES FROM FLUE GASES. *(Abscheiden von teerartigen Stoffen aus Rauchgasen). Wasser Luft Betrieb, 17(9):319, 1973. Translated from German, 2p.*

Electrostatic precipitators have some disadvantages in the removal of tar substances from flue gases because of low separation efficiency. Efficiency can be improved by cooling the tar-bearing flue gas; this causes encrustation of the filter panels, however. Tars can also be removed by cooling with injected water. Tar fractions with a high congealing point are then separated in an electrostatic precipitator downstream from the first cooling stage, and tar oils and water are separated downstream from the second cooling stage. This method is expensive since it requires two precipitators and large maintenance costs. To remove tar from oil- and gas-fired furnace flue gas with high efficiency, water can be injected into the hot flow of the flue gas. The water vapor increases the dielectric constant of the flue gas, and thus improves efficiency of the precipitator.

44922 APTIC NO. 65451

(Inventor not given.)

AN ARRANGEMENT FOR PURIFYING THE EXHAUST GAS OF AN INTERNAL COMBUSTION ENGINE AND A DEVICE FOR INCORPORATION IN SUCH AN ARRANGEMENT *(Toyo Kogyo Co., Ltd., Hiroshima (Japan)) Brit. Pat. 1,312,471. 6p., April 4, 1973. (Appl. April 17, 1970, 8 claims).*

This invention concerns an improved exhaust gas purifying arrangement for an internal combustion engine, more especially to an arrangement including a device for controlling the amount of secondary air to be supplied to an exhaust gas system by controlling the air pressure within a conduit connecting the exhaust gas system to an air pump and to such a device. In the conventional system, if excess secondary air is supplied to the exhaust gas system at a low engine speed or low vehicle speed, the temperature of the exhaust gases decreases with the result that the efficiency of an afterburning device or catalytic device in the exhaust gas system is reduced. If excess secondary air is supplied to the exhaust gas system at high engine speed or high vehicle speed, the temperature of the exhaust gas increases excessively, with the result that the durability of the exhaust gas system is greatly reduced. This invention eliminates these disadvantages by employing pressure-sensitive valves that are actuated according to the speed of the engine to deliver the secondary air.

44923 APTIC NO. 65607

STATUS-QUO OF DESULFURIZATION EQUIPMENT. *(Datsuryu sochi no secchi no jokyo). Kanagawa Prefecture (Japan), Public Nuisance Control Office. Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 15:226-231, Feb. 1973. 3 refs.*

The principles, characteristics, and problems of desulfurization equipment are described. Major desulfurization processes for stack gases employed in Japan, U.S., France, USSR, and Czechoslovakia are described. The sulfur dioxide removal system which produces gypsum is described. Lime and limestone scrubbing systems for dust and SO2 removal are also described. Various by-products recovery techniques are mentioned.

1972

44924 APTIC NO. 65039

Akira, Ogawa, Ikemori Kikaku, Hirasawa Munenori, and Komuro Kazuo

THEORY OF FLOW PATTERNS AND CUT SIZE OF PARTICLES IN A ROTARY FLOW DUST COLLECTOR. *(Niji kiryu-gata ssikuron no furo patan to genkai ryushikei no riron). Funtai Kogaku Kenkyu-kaishi (J. Res. Assoc. Powder Technol., Japan), 9(6):17-24, 1972. 9 refs. Translated from Japanese, 22p.*

Theoretical and experimental results of tests of a secondary air current cyclone are reviewed. The dust collector is based on the principle of centrifugal separation of solid particles. Experimental values of the limit particle diameter size have been reported to be considerably smaller than those in conventional cyclones. However, in the model secondary air current type cyclone tested, the anticipated collection efficiency could not be obtained when talc (x50 equal to 8.4 micron) was tested as the powder. A cascade impactor was used to study this point further. The values of partial collection efficiency were sought from the particle diameter distributions of the talc discharged from the cyclone, and the limit particle diameter (cut size) values were determined from them. Next, a cylindrical-type pitot tube was used to obtain the peripheral velocity and the axial velocity values in order to study the flow patterns. A theoretical equation for the limit particle diameter was derived from the relationship between this peripheral velocity distribution and flow patterns. The results displayed extremely good agreement with the experimental values.

44925 **APTIC NO. 65414**

Bjerle, Ingemar

ABSORPTIVE REMOVAL OF SULFUR DIOXIDE FROM FLUE GASES. *(Fjerning av svoveldiokysd i rokgasser ved absorpjon). Text in Norwegian. Tidsskr. Kjemi. Bergvesen Met., 32(2):18-20, March 1972.*

Apparatus and processes for the absorption of sulfur dioxide from flue gases generated especially in thermal power plants are described. Packed columns provide a large contact surface but generate considerable pressure loss, while spray towers, operating at low pressure loss, provide only limited contact surface. In Bahco scrubbers, both the flue gas and the wash liquid stream upwards at high speed in parallel flow, and the entrained droplets are separated in a subsequent cyclone. Fluidized-bed absorbers with a wash liquid spray have not been used under full-scale conditions, though they provide a rather low pressure loss. Jet absorbers by BASF and multijet absorbers by KTH, Stockholm, provide a fine dispersion of the flue gas over the wash liquid volume, and thus a highly intense mass exchange in a short time. Alkaline solutions, such as calcium hydroxide and calcium carbonate suspensions with high hydroxyl ion concentrations, are used for the selective absorption of SO2 from flue gases at short contact times. In the case of calcium hydroxide suspensions, the SO2 absorption is controlled at the gaseous phase, while in calcium carbonate suspensions, the absorption process is partly controlled at the liquid phase.

44926 **APTIC NO. 65431**

Guasco, Raymond

CATALYST WALL FOR DOMESTIC BUTANE/PROPANE HEATER. *(Katalysatorwand fuer Heizgeraete). Text in German. (Societe Anonyme Francaise du Ferodo, Paris (France)) W. Ger. Pat. Appl. 1,667,282. 5p., Feb. 10, 1972, 3 refs. (7 claims).*

The gas inlet side of the asbestos cloth contains 25% to 80% of the catalyst amount, which is applied to the gas outlet side. Catalyst is applied to the entire gas outlet side, but only to a maxmimum of 80% of the gas inlet surface. This arrangement is highly effective in limiting carbon monoxide emissions.

44927 **APTIC NO. 65427**

Koy, Herman and Ivan Keserin

TENSIONING PRECIPITATOR ELECTRODES. *(In Bohrungen von Rahmen angeordnete Spruehelektroden). Text in German. (Metallgesellschaft AG, Frankfurt (Germany)) W. Ger. Pat. Appl. 2,044,738. 7p., March 16, 1972. 4 refs. (7 claims).*

Corona electrodes for electrostatic dust precipitators are fitted in bores of frames and fastened by wedges. One end of the electrodes is rod-shaped and has an abutment; for clamping the electrode a wedge is used between the pipe frame and the abutment, and is welded to the pipe frame after the corona wire end has been stressed. Preferably the wedge is driven between an abutment at the end of the electrode and the pipe frame.

44928 **APTIC NO. 65355**

Regehr, Ulrich and Siegfried Bulang

GAS DROPLET SEPARATOR. *(Vorrichtung zum Abscheiden von Tropfen). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 2,246,475. 4p., Sept. 22, 1972. (3 claims).*

A drop separator for flowing gases has parallel, spaced separator walls, with a curved or trapezoidal cross section with inflow and outflow sections and guide grooves. Chamber partitions are orthogonal to the separator walls, which are corrugated with crests and troughs, whose long axes are inclined to the flow direction. The profiling adjoins unprofiled exit zones whose edge is held in slot-shaped recesses in the partition walls.

44929 **APTIC NO. 65403**

Santiago, Andres and Enrique Santiago

CATALYTIC EXHAUST PURIFIER. *(Vorrichtung zur katalytischen Reinigung der Auspuffgase von Brennkraftmaschinen). Text in German. (Zeuna-Staerker AG, Augsburg (West Germany)) W. Ger. Pat. Appl. 2,220,921. 4p., April 28, 1972. 3 refs. (6 claims).*

A durable catalytic exhaust purifier with high shock strength is described. The exhaust purifier is composed of two coaxial cylinders, one placed inside the other; the catalyst body, placed in the inner cylindrical metallic housing, is retained by rings in a resilient non-flammable mineral fiber at its end faces. Further rings of the same material support the inner housing inside the outer housing at points outside the catalyst supports. All rings are under radial tension.

44930 **APTIC NO. 65274**

Sherwood, Thomas K.

PROCESSES FOR REMOVAL OF SULFUR FROM COMBUSTION PRODUCTS: THE CHALLENGE TO CHEMISTS. *Int. J. Sulfur Chem., Part B, 7(1):1-9, 1972.*

Processes for removal of sulfur from combustion products are discussed with emphasis on sulfur dioxide removal from stack gases. The processes which are reviewed include: the Battersea plant in London, the Howden-I.C.I. process, and wet and dry lime processes. The Wellman-Lord and the Monsanto Cotox processes are being successfully tested commercially. A process for removing SO2 from stack gases is suggested for development patterned after the Stretford process for reducing hydrogen sulfide. The absorbent should be clear, aqueous, with low vapor pressure, and a high carrying capacity for SO2. It should be highly reactive and regenerable at about 250 F at modest pressure. Current expectation of commercial installations removing 80-90% of the S from 1 million cu ft of a gas containing only 0.2% SO2 at a cost of about $6.00 is not sufficient.

44931 **APTIC NO. 65055**

Tomosada, Jotaki, Tomita Yuji, and Yoshida Koichi

CONCERNING THE PRESSURE LOSS OF CYCLONE SEPARATORS -- CONCERNING THE PRESSURE LOSS WITH AIR ONLY. *(Saikuron bunriki no atsuryoku sonshitsu ni tsuite -- Kuki nomi no atsuryoku sonshitsu ni tsuite). Funtai Kogaku Kenkyu-kai shi (J. Res. Assoc. Powder Technol., Japan), 9(6):9-16, 1972. 9 refs. Translated from Japanese. 17p.*

Since the pressure loss of cyclone separators is proportional to the 1.8-2.3 power of the cyclone inlet velocity, the exact figure depends on the shape and dimensions of the cyclone separator which is used, and it is difficult to determine the pressure loss mathematically. An approximate equation was therefore compiled for the pressure drop with the air only in which there could not be very great changes in the values of the constant c. Experiments were performed to provide data for the equation. The approximate equation for calculating the pressure loss was compiled by taking the pressure loss coefficient based on the representative velocity of the cyclone separator. The constant was approximately 6.5-7.5. Even when values of the constant were given in other monographs, the results remained generally within the range of 6.5-7.5.

44932 **APTIC NO. 65479**

Parsons (Ralph M.) Co., Los Angeles, Calif.

DEMONSTRATION PLANT, CLEAN BOILER FUELS FROM COAL, PRELIMINARY DESIGN/CAPITAL COST ESTIMATE. (VOLUME I). *Office of Coal*

Research Contract 14-32-0001-1234, R and D Rept. 82, Interim Rept. 1, 81p., 1972 (2).

GPO

The preliminary design and capital investment estimate for a demonstration-scale plant to produce clean boiler fuels from coal are summarized. The demonstration plant has the capacity to process 10,000 tons coal/day and produce approximately 25,000 barrels of liquid products. The primary products consist of two grades of clean boiler fuels; secondary products are a high grade naphtha and sulfur. Projected waste gas is 19,430 tons/day. The largest quantity boiler fuel will be roughly equivalent to a No. 6 fuel oil, contain 0.5% S, and provide 65% of boiler fuel energy produced. The second boiler will appproximate a No. 4 fuel oil with 0.2% S and contain 35% of the fuel product. The coal conversion process plants will consist of a coal liquefaction unit and a gasifier unit to produce synthesis gas from coal derived materials. The ligher clean boiler fuel, containing 0.2% S, will be produced by hydrodesulfurization of a portion of the de-ashed solvent refined coal produced in the process plant. By-product gases produced will be burned captively as fuel to produce the necessary steam and electrical energy required to operate the complex.

1971

44933 APTIC NO. 65468

De Palma, Ted Vernon and Martin Wendel Perga

EXHAUST GAS CONVERTER MUFFLER. *(Katalytische Nachverbrennungseinrichtung fuer die Auspuffgase von Brennkraftmaschinen). Text in German. (Universal Oil Products Co., Des Plaines, Ill.) W. Ger. Pat. Appl. 2,102,255. 3p., Aug. 19, 1971. 3 refs. (5 claims).*

A catalytic afterburner for engine exhaust gases has a long housing with a gas connection pipe at each head slide. A double - walled hollow body, V - shaped in longitudinal section, receives the catalyst mass and is fitted within and symmetrical to the long axis of the housing, and has gas - permeable parallel walls; its wide end abuts one head side of the housing, and its tip projects freely into it. The catalyst chamber is formed by the body, which tapers in the general gas flow direction and has inner and outer gas-permeable sidewalls, with edges sealed end- on to the housing. The gas inlet chamber has an inlet connection; the gas outlet chamber, with an outlet connection, surrounds the body.

44934 APTIC NO. 65426

Frankel, Donald Page and Maurice Edward Christenson

COMBUSTION CHAMBER AND EXHAUST DUCT. *(Abtritt mit einer als Aufnahmebehaelter dienenden Verbrennungskammer). Text in German. (La Mere Industries, Inc., Walworth, Wis.) W. Ger. Pat. Appl. 1,526,083. 5p., Sept. 30, 1971. 6 refs. (2 claims).*

The wall part of the valve has the opening connected to the exhaust gas duct, and its bottom tubular opening lies on the floor of the combustion chamber in the closed position. There is a gas burner in the combustion chamber and a fan in the exhaust duct. Solid wastes are completely incinerated, and a high enough temperature is reached to destroy all volatiles and vapors causing unpleasant odors.

44935 APTIC NO. 65441

Hornung, Klaus

COAL CHARGING GAS SCRUBBER. *(Fuellwagen fuer Koksofenbatterien). Text in German. (Heinrich Koppers GmbH, Essen (Germany)) W. Ger. Pat. Appl. 1,671,330. 3p., Aug. 26, 1971. (2 claims).*

An exhaust pipe for each coal charging car outflow is tangentially arranged around the top part of an extended annulus of the outflow. The exhaust line leads to a peg-mill type scrubber and is fitted with spray nozzles. The suction elbow of the peg-mill type scrubber is designed as an additional centrifugal separator. A spray nozzle is arranged at the inlet to the scrubber. The peg-mill scrubber is relieved of large amounts of coarse dust and water. The scrubber becomes more effective for ultrafines and tar mixtures and wear is reduced.

44936 APTIC NO. 65385

Kawakita, Takao and Kenya Motoyoshi

VALVE SEAT RINGS FOR LEAD-FREE GASOLINE ENGINE. *Sumitomo Electr. Tech. Rev., no. 15:57-71, Aug. 1971. 3 refs.*

If lead-free gasoline is used in a conventional engine to reduce lead pollution and degradation of catalytic converters, extraordinary wear takes place on the seats of the inlet and exhaust valves. Therefore, a new valve seat material suitable for lead-free gasoline engines was developed made of sintered chromium steel with excellent heat and wear resistance. The use of lead-free gasoline, wear on valve seats, and the properties of sintered chromium steel as a material for valve seats are reviewed. Results are given of bench and field tests of the new valve seats in lead-free gasoline engines.

44937 APTIC NO. 65360

Sauermann, Werner

AIR FILTER WITH PULSE CLEANING. *(Filter mit Spuelluft- Stossabreinigung). Text in German. (Standard Filterbau Dr. E. Andreas KG, Muenster (Germany)) W. Ger. Pat. Appl. 1,757,515. 3p., June 16, 1971. 1 ref. (7 claims).*

A self cleaning filter uses the kinetic energy of an air column flowing round a ring duct to provide a pressure pulse to clean filter bags on air filters by reverse flow. Filter action is conventional but on cleaning cycle control, the clean air chamber is isolated by a flap valve and then air from a closed ring duct is diverted into the clean side of the filter bags, a coupled valve simultaneously allowing fresh air into the ring duct. The kinetic energy of the air at 40 m/s in the air duct then provides the pulse which cleans the bags, the reverse flow also assisting dust particles to fall into the hopper below. The system uses only comparatively inexpensive fans rather than compressors to induce the airpulse.

1970

44938 APTIC NO. 65444

Litzenburger, Toni and Wilhelm Wetteborn

SOLID OR LIQUID PARTICLE SEPARATOR BAFFLE. *(Abscheider fuer einem stroemenden Medium mitgefuehrte Fluessigkeitstropfen oder Feststoffpartikeln). Text in German. (Kloeckner-Humboldt-Deutz AG, Koeln (Germany)) W. Ger. Pat. Appl. 1,542,267. 2p., Oct. 8, 1970. 2 refs. (1 claim).*

A separator for entrained liquid droplets or solids from heavily contaminated industrial gases has louvre-like vertical or inclined baffles with a trough collecting space at their trailing edges. The angle formed by the flow direction of the medium or the axis of the channel through which the medium flows, and the baffle surfaces is less than 50 degrees in pressure operation of the separator, and is greater than 40 degrees in suction operation.

44939 APTIC NO. 65432

Ludwig, Winfried, Rudolf Oster, and Hans Urbach

REMOVAL OF PHENYLAZIDE FROM GASEOUS MIX. *(Verfahren zur Entfernung von Phenylazid aus Gasen). Text in German. (BASF AG, Ludwigshafen (Germany)) W. Ger. Pat. Appl. 1,814,493. 1p., June 25, 1970. (1 claim).*

Phenylazide is removed from a gas by passing the gas through a wash column with 50-100 wt% sulfuric acid. When phenyldiazonium chloride is reduced with sodium bisulfite to get phenylhydrazine, phenylazide is a by-product. Sulfur dioxide is used in excess and the recovery is important. The phenylazide, which is explosive, must be separated from the SO2-containing gas.

44940 **APTIC NO. 65434**

Regehr, Ulrich

DEVICE FOR SEPARATION OF PARTICLES FROM GASES HAVING WAVE-SHAPED FLOW CHANNELS AND CATCH GROOVES. *(Vorrichtung zum Abscheiden von Teilchen aus Gasen). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 1,544,114. 5p., Aug. 13, 1970. 5 refs. (5 claims).*

A device for separation of solid or liquid particles from gases comprises several spaced, adjacent, repeatedly bent profiled plates, which form wave-shaped flow channels, and are provided with catch grooves at the apexes of the impact positions. A special feature is the similarity of the sinuous profile of the catch grooves to that of the profiled plates. This design gives higher separating efficiency.

44941 **APTIC NO. 65442**

Thornton, James F.

COMBUSTION GAS PURIFICATION BY EXTRACTION OF SULFUR OXIDES. *(Verfahren zur Reinigung schwefeldioxidhaltiger Verbrennungsabgase). Text in German. (Lummus Co., Bloomfield, N. J.) W. Ger. Pat. Appl. 1,669,317. 4p., Dec. 10, 1970. 3 refs. (2 claims).*

The raw flue gases pass via a first cyclone separator into a mixing duct where the oxides, especially calcium oxide, magnesium oxide, or calcined dolomite, are injected in finely powdered form and then to a second separator in which the resultant sulfites are cycloned and fed from the cyclone to a duplex fluidized bed reactor in the first bed of which they are heated to above decomposition temperature by supplementary flue gases and then air cooled in the lower bed before feeding into a recycling loop. The heated cooling air is used to burn coal to provide the auxiliary flue gases. Initial absorption is at 121-538 C.

1969

44942 **APTIC NO. 65443**

Bracht, Guenther, Wilhelm Schneider, Hans Sredenscheck, Pater Hermanns, and Heinz Marek

DUST BINDING PASTE PRODUCTION FROM MAGNESIUM CHLORIDE SOLUTION. *(Verfahren zur Herstellung von Pasten zur Staubbindung). Text in German. (Ruhrkohle AG, Essen (Germany)) W. Ger. Pat. Appl. 1,492,297. 2p., Oct. 30, 1969. 1 ref. (1 claim).*

The paste is suitable for binding dust of all kinds, e.g. coal dust in mines. Separate addition of emulsifier and maturing are obviated and any temperature between -10 C and below the boiling point of water can be used, the heat from the exothermic hydration of calcium hydroxide being utilized to dissolve the wetting agent. The thixotropic behavior of the paste facilitates transport and pumping. It forms thick films which bind dust permanently and is capable of binding almost twice its weight of dust. It is universally applicable and need not be specially adapted to a particular climate.

44943 **APTIC NO. 65356**

Loftheim, Tor Bjorn

DUST SEPARATION BY BLADED ROTOR IN HOUSING. *(Fliehkraft- Staubabscheider mit Schleuderfluegelrad). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 1,407,963. 3p., Oct. 2, 1969. 3 refs. (3 claims).*

A dust-separator comprises a centrifuging rotor housed in a fixed casing and having curved blades which receive the axial feed of air and deflect it along a conical path towards the outer casing wall; the purified air leaves the open ends of the channels formed between the blades, while the dust together with a small quantity of air is trapped in a collection chamber. The form of each blade, considered, in section in the circumferential direction opposite to that of rotation, is as follows; a curved portion has a transition edge, followed by a flat portion which extends back beyond the transition edge of the next blade behind and thus constitutes a pocket between two adjacent blades; the rear edges of the blades and thus the bases of these pockets all lie on an imaginary conical surface concentric to the shaft. The base of each pocket is constituted of a cranked portion at the rear edge of the blade, joined to the central region of the blade next behind.

44944 **APTIC NO. 65458**

(Inventor not given.)

CARBURETOR FUEL/AIR ADDITIONAL MIXING SYSTEM. *(Einrichtung zum weiteren Aufbereiten von einem Vergaser fuer Brennkraftmaschinen geliefertem Brennstoff-Luft-Gemisch). Text in German. (Atox Trust Reg., Vaduz (Liechtenstein)) W. Ger. Pat. Appl. 1,576,447. 3p., Sept. 18, 1969. (4 claims).*

The system incorporates a measuring device, comparing the position of the main throttle butterfly with the vacuum downstream of it. This emits an impulse to the auxiliary air supply control, so as to reduce the auxiliary air supply as the throttle opens and the vacuum drops, and increase it as the latter rises. The control can be effected by an electronic circuit, operating a solenoid-controlled air slide valve, and the auxiliary air opening can be in the carburetor intake opposite the inlet of the idling jet system. With this system an improvement of the fuel-air mixing is achieved (mainly in the lower load range and at low revolution).

1966

44945 **APTIC NO. 65449**

Bush, A. F. and E. S. C. Bowler

ELECTRON MICROSCOPE STUDIES OF A BAG FILTERHOUSE PILOT INSTALLATION ON A COAL FIRED BOILER. *California Univ., Los Angeles, Dept. of Engineering, Air Preheater Co., Inc., Contract 151873, Rept. S. I. 405, 36p., Sept. 1966.*

A study of the particulate emissions brfore and after a fabric filter unit (filterhouse) as installed on a coal fired boiler is presented. Samples were taken at three locations: duct (inlet) between 22B heater and filterhouse (30 in. after booster fan before orifice); duct (outlet) from filterhouse; and 22B heater gas outlet. A total of 105 photomicrographs were made (7 reports were requested, 15 photomicrographs included in each report). The bag filters remove all of the material 0.20 micron and above, but there are a large number of particles in the size range 0.03 micron to 0.10 micron in the air sample leaving the filterhouse. Apparently some mechanism of breaking up large particles is present in the fabric filter operation.

1965

44946 **APTIC NO. 65056**

Yoshida, Tetsuo, Naomasa Morishima, Motomitsu Suzuki, and Naohiro Fukutome

PRESSURE LOSS IN ACCELERATION OF ATOMIZED DROPLETS CONCERNING PRESSURE LOSS IN VENTURI SCRUBBERS. *(Funmu ekiteki no kasoku ni okeru atsuryoku sonshitsu -- Benchuri sukuraba no atsuryoku sonshitsu ni tsuite). Kagaku Kogaku (Tokyo), 29(5):24-32, 1965. (Presented at the Society of Chemical Engineering Convention, 29th.) Translated from Japanese, 27p.*

Almost all of the pressure loss in venturi scrubbers is caused by the use of energy when the liquid is atomized and accelerated by a high-speed air current. Experimental and theoretical results concerning this pressure loss and the influence of droplet size on pressure loss and acceleration of droplet particles in venturi scrubbers are compared. Equations are presented for droplet movement, pressure loss, adhesion of droplets to wall surfaces, and the diameter of droplets. The experimental equipment and results are discussed. An appendix is given concerning two-phase flow pressure loss in the diffuser part.

MEASUREMENT METHODS

1974

44947 **APTIC NO. 68085**

Adams, D. F., J. O. Frohliger, D. Falgout, A. M. Hartley, J. B. Pate, A. L. Plumley, F. P. Scaringelli, and P. Urone

TENTATIVE METHOD FOR CONTINUOUS MONITORING OF ATMOSPHERIC SULFUR DIOXIDE WITH AMPEROMETRIC INSTRUMENTS. *Health Lab. Sci., 11(4): 336-341, Oct. 1974. 12 refs.*

A tentative amperometric method for the continuous monitoring of atmospheric sulfur dioxide is described which is applicable when other sulfur compounds or interferents do not exceed 5% of the SO2 concentrations. Sulfur dioxide and other reducing gases present in the air sample react with electrically generated, free halogen (titrant) in a detector cell which contains two pairs of electrodes functioning as an anode/cathode and as a sensor/reference. The cell and its associated electronics operate to maintain a constant titrant concentration in the electrolyte. Any compound introduced into the cell that reacts with the titrant will change the titrant concentration and produce a potential change in the solution that is detected by the sensor/reference electrode pair. During a titration the current passing through the cell is measured as the potential drop across a precision resistor having a low temperature coefficient. Optimum operating range for the amperometric SO2 detector is 26-5200 micrograms/cu m, and overall accuracy is 1% (relative). Any compound in the air sample capable of oxidizing bromide to bromine or iodide to iodine under the conditions in the cell will be sensed as excess titrant.

44948 **APTIC NO. 68110**

Andreini, Pierangelo, Ferruccio Ferrario, and Giorgio Sotgia

EXPERIMENTAL AND STATISTICAL RESEARCH WITH THE WEIGHT METHOD ON ERROR MEASUREMENT OF SOLID CONTENTS IN GASES IN INDUSTRIAL PLANTS. *(Indagine sperimentale e statistica sugli errori di misura del contenuto solido nei gas negli impianti industriali con il metodo ponderale). Text in Italian. Termotecnica (Milan), 28(6):341-347, 1974. 10 refs.*

Dust concentration measurements with simple dust collection probes are discussed. The device which produced the experimental data was constructed to simulate fluid dynamic conditions of gases in industrial locations. The hypothesis of measurements taken on non-singular fluid dynamic points made with accuracy and commanded by a chain of samples, is supported by mean values proving good probe applicability. Conclusions may be drawn about the moderate dispersion of the averages of the measurements from the limited width of the gap. The effect of a wrong angle probe has also been analyzed with the suction flow rates near nominal isokinetic conditions.

44949 **APTIC NO. 65244**

Bambeck, Robert J. and Hermann F. Huettemeyer

OPERATING EXPERIENCE WITH IN-SITU POWER PLANT STACK MONITORS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1974. 3 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-109.)*

Actual operating experience on four in-situ monitors operating at the Redondo Generating Station of Southern California Edison Co. are reviewed and documented. The results are for 1-year experience with two nitric oxide, carbon monoxide, and opacity monitors and two NO monitors. On the average, each instrument had 13.5 service calls. Preventive maintenance was performed during 9.5 of these visits. The average time an instrument was out of service (primarily due to difficulties with the light source) amounted to 67.5 hr. The average out of service interval was 5.0 hr. It required an average 2.1 hr to work on the instrument. The actual number of hours out of service have an up time of in excess of 99%. (Author abstract modified)

44950 **APTIC NO. 65243**

Beamish, Michael C., Roger Mellor, and Robin P. Rankine

CONTINUOUS MASS EMISSION MONITORING SYSTEMS FOR STATIONARY COMBUSTION SOURCES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 32p., 1974. (Presented at the AAir Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-108.)*

Two different types of continuous emission monitoring systems for sulfur dioxide from stationary sources are described. They include: a continuous stack emission monitor (CSEM) and an analytical flow ratio-monitoring system (AFR). Records of CSEM performance indicate the systems can remain on line approximately 90% of the time. Operating results and consideration of costs indicate that the optimum location for the analyzer is on the stack rather than remote from the sample point. While the CSEM system serves mainly to monitor, record, and report stack SO2 mass emissions to government regulating agencies, it is also capable of detecting plant problems. The AFR system was designed to monitor sulfur recovery plant performance. The AFR system can be used in closed loop control for maintaining high S recovery efficiences and hence low pollutant emissions. The analytical principle of the AFR is a continuous monitoring and computation of the carbon to S ratio in the gas entering the S recovery process. Accuracy of the efficiency reading increased with plant efficiency; however, accuracy is not essential for plant control and optimization. (Author abstract modified)

44951 **APTIC NO. 65247**

Benson, Arthur L., Philip L. Levins, Arthur A. Massucco, and James R. Valentine

DEVELOPMENT OF A HIGH-PURITY FILTER FOR HIGH-TEMPERATURE PARTICULATE SAMPLING AND ANALYSIS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1974. 5 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th Denver, Colo., June 9-13, 1974, Paper 74-114.)*

Particulate handsheet filters with satisfactory purity, efficiency, thermal stability, cost strength (about 1 lb/in.), and flexibility for analysis of particulates in gases up to 800 C were made with 99.2% silicon oxide Microquartz fibers. Commercial production on a papermaking machine is currently being considered. Cost is estimated to be about $1.00/sq ft. Almost all purity requirements for optimum atomic absorption and flame emission spectrophotometric analysis for trace metals was achieved. The filters appear highly promising for X-ray fluorescence analysis, but should be further evaluated. Suitability of the filters for neutron activation analysis is uncertain and should also be further evaluated. Dioctyl phthalate (DOP) aerosol efficiencies of 99 to 99.9% were achieved by using fibers of various diameters. The filters are insensitive to humidity, insoluble to most acids and organic solvents, and slightly alkaline (pH 9-10). The strength and flexibility result from a novel combination alkali and 800 C heat treatment. The heat treatment also decreases extractable impurities and moisture sensitivity. (Author abstract modified)

44952 **APTIC NO. 68079**

Cannon, Theodore W.

A CAMERA FOR PHOTOGRAPHY OF ATMOSPHERIC PARTICLES FROM AIRCRAFT. *Rev. Sci. Instr., 45(11):1448-1455, Nov. 1974. 13 refs.*

A special camera for installation on a research sailplane to take in situ photographs of atmospheric particles is described. The photographs can be used to ascertain ice particle shapes, sizes, and concentrations; raindrop sizes and concentrations; and estimates of cloud droplet concentrations and maximum sizes. The camera is capable of photographing particles as small as about 4 micron in radius, with the size of thy largest particle completely imaged being limited by the 24 by 36 mm projected area photographed. Liquid particles can be distinguished from ice particles for radii greater than 50 micron. Both in-focus and out-of-focus images can be used for obtaining concentration and size data by techniques described. Examples of photographs of ice particles, raindrops, and cloud droplets are illustrated, and camera improvements for obtaining more data for a given length of flight are suggested. (Author abstract modified)

44953 **APTIC NO. 65565**

Chan, P. W., O. Apichatanon, and C. Y. She

PARTICLE SIZE MEASUREMENTS OF ARC SMOKES BY FORWARD SCATTERED INTENSITY RATIO TECHNIQUES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1974. 8 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-236.)*

The measurement of size distributions of polydisperse particulate matter with unknown refractive indices is discussed. The time-averaged intensity ratio measurements including intensity ratio at two angles and polarized ratio at one angle, were carried out at several small forward-scattering angles so that the measured values are essentially independent of the index of refraction. Results were presented for smoke generated by electric arc discharges between carbon, copper, aluminum, and tungsten electrodes. In the two-angle ratio method, the average size is obtained by using the theory of Hodkinson. In the polarization method which is more suitable for sub-micron particles, the experimental curve of polarization ratio of several scattering angles is fitted by a theoretical best fit using a logarithmic normal size distribution, from which the modal value of the radius and the logarithmic deviations are obtained. The optical system was calibrated with standard latex spheres. The fit was found to be rather good for the arc smokes (polydisperse systems) and good for latex (monodisperse spheres). Combination of the two schemes in one instrument may provide a device for sizing polydisperse particulate systems from .01 micron to 10 micron in diameter, independent of refractive index. The possibility of measuring size distribution in real-time using instantaneous measurements based on the above schemes are considered. With some improvements, the device will be able to size particulate systems up to 10 to the 7th power/cc or higher at a flow rate of 1000 cm/sec using commercially available electronics. The same device will also count the number density to determine the particle concentration.

44954 **APTIC NO. 65256**

Cirillo, Richard R., Thomas D. Wolsko, and Jay E. Norco

THE EFFECT OF COLD START ON MOTOR VEHICLE EMISSIONS AND RESULTANT AIR QUALITY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1974. 11 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Collo., June 9-13, 1974, Paper 74-127.)*

A method for quantitatively evaluating the effect of cold start on motor vehicle emissions and resultant air quality is presented. Weaknesses in using emission factors based on the 1975 Federal Test Procedure (FTP) for light duty vehicles are enumerated and an alternative technique is suggested. Data are presented which enable the cold start emissions to be separated from the hot operating emissions and emission factors for different model year vehicles are developed. In a sample case of the motor vehicle emissions in the Chicago central business district, emissions are computed using both the 1975 FTP emission factors and the hot cold separated factors. Comparison is made with measured air quality. The 1975 FTP distorted the spatial and temporal distribution of emissions because of the cold start phenomena. Adequate data are available to separate cold start and hot operating emissions. The use of the separated factors improved the correlation of emissions to air quality. Transportation control plans for air quality improvement should be developed with cold start considerations. (Author abstract modified)

44955 **APTIC NO. 65568**

Copeland, Gary E., Roger N. Blais, Gary M. Hilton, and Earl C. Kindle

DETECTION AND MEASUREMENT OF SMOKE PLUMES IN AERIAL AND SATELLITE (ERTS-1) IMAGERY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 19p., 1974. 7 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-240.)*

Classical photogrammetric examination of aerial photography and ERTS-1 satellite imagery of Eastern Virginia has been used with ground truth to: detect and define the geometrical characteristics of smoke plumes; locate sources; define areas (remote from sources) of intense fumigation potentials; determine effective stack heights; identify source regions of great aerosol concentration potentials; provide input parameters to plume models; observe jet contrail effects on the earth s local albedo; and determine local flow speeds. Observations of specific sites via ERTS-imagery on a seasonal basis coupled with topographical and climatological modeling is of value as input to urban planning and control strategies. (Author abstract modified)

44956 **APTIC NO. 65246**

Corte, G. L, R. C. Lao, G. Dowd, and J. L. Monkman

THE ACCURATE CALIBRATION OF CONTINOUS MERCURY VAPOR MONITORS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1974. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-112.)*

Five mercury vapor monitors were subjected over an extended period of time to exhaustive evaluation studies against two established techniques, the integrated silver method and a laboratory reference photometer. The reference instrument was calibrated, in part, by means of a built-in optical filter which stimulates an air concentration of 2 ppb of Hg in air when used in the continuous sampling mode. The precision of the optical filter calibration was verified by the injection of known volumes of saturated Hg vapor. The two calibration procedures were found to agree within 3.9%. The monitors were operated simultaneously in a laboratory room with a volume of approximately 2000 cu ft. Measurements made with the various instruments under test were compared with the Reference method and the Reference instrument. The overall procedures allows one to calibrate instruments of uncertain performance as to the specificity of response, the accuracy, and the sensitivity. This calibration procedure is described in detail. (Author abstract modified)

44957 **APTIC NO. 68077**

Dimitriades, B., W. A. Cook, J. E. Cuddeback, E. F. Ferrand, R. G. Kling, E. L. Kothny, P. W. McDaniel, G. D. Nifong, and F. T. Weiss

METHODS FOR MEASUREMENT OF NITROGEN OXIDES IN AUTOMOBILE EXHAUST: A STATE-OF-THE-ART REPORT. *Health Lab. Sci., 11(4):360-365, Oct. 1974. 17 refs.*

The state-of-the-art of methods for the measurement of nitrogen oxides in automobile exhaust is reviewed. Methods reviewed include: the phenoldisulfonic acid method using spectrophotometry, the Saltzman colorimetric method, non-dispersive infrared absorption, non-dispersive ultraviolet absorption, dispersive infrared and ultraviolet absorption methods, chemiluminescence, and electrochemical analysis. Separate measurements of nitric oxide and nitrogen dioxide can best and most reliably be made using chemiluminescence for NO and non-dispersive ultraviolet for NO2. The disadvantage of this NOx measurement technique is that it requires the use of two analytical methods. Conversion of NO2 obviates the need for NO2 measurement; however, uncertainties regarding the degree of NO2 conversion and the response to other nitrogenous components of the sample either penalize the method s accuracy or dictate inclusion of additional procedural steps that increase the method s complexity. Following NO2 conversion, resultant total NO can be measured by chemiluminescence, non-dispersive infrared, or the electrochemical cell method. Chemiluminescent and electrochemical methods have the advantage of not requiring drying of the sample stream.

44958 **APTIC NO. 68096**

Driscoll, John N.

SAMPLING AND ANALYTICAL TECHNIQUES FOR MERCURY IN STATIONARY SOURCES: A STATE-OF-THE-ART REPORT. *Health Lab. Sci., 11(4):348-353, Oct. 1974. 27 refs.*

The state-of-the-art of mercury sampling and analytical techniques is reviewed for chloralkali and ore processing operations. Sampling methods include: absorption with aqueous iodine monochloride or aqueous potassium permanganate, amalgamation with silver or gold, and charcoal adsorption. Palladium chloride is also an efficient adsorbent for mercury, though no studies on the recovery of mercury from the compound are reported. Iodine monochloride absorption offers high collection efficiency and is successfully used for chloralkali plants. Non-reproducible blanks, lack of differentiation between gaseous and particulate compounds, and non-quantitative recovery in the presence of sulfur dioxide are disadvantages of iodine monochloride absorption. Potassium permanganate absorption offers an improvement in so far as low blanks are required and high concentrations of SO2 do not interfere. Analytical methods include: polarography, nephelometry, neutron activation, anodic stripping voltammetry, and optical methods such as atomic absorption. Mercury from non-ferrous smelters can be collected with a gold amalgamation technique.

44959 **APTIC NO. 65233**

Elwood, James H. and Ronald H. Dieck

TECHNIQUES AND PROCEDURES FOR THE MEASUREMENT OF AIRCRAFT GAS TURBINE ENGINE EMISSIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 26p., 1974. 15 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-90.)*

The measurement of emissions from aircraft gas turbine engines using on-line instrumentation systems designed both in accordance with the Aerospace Recommended Practices and in response to the operational needs of a large experimental engineering test facility is presented. The Committee on Aircraft Exhaust Emissions Measurement issued two practices, ARP 1179 Aircraft Gas Turbine Exhaust Smoke Measurement and ARP 1256 Procedure for the Continuous Sampling and Measurement of Gaseous Emissions (hydrocarbons, nitrogen oxides, carbon monoxide, and carbon dioxide) from Aircraft Turbine Engines. In addition to a discussion of the systems, the experience derived from continuous testing programs in support of this test facility is described with consideration given to the specific problems of sampling, sample handling, system accuracy, and data recording and reduction. The practical limitations of the recommended methods and procedures as applied to emission control technology programs are discussed and suggestions are presented for improving the measurement technology. (Author abstract modified)

44960 **APTIC NO. 65245**

Ensor, D. S., L. D. Bevan, and G. Markowski

APPLICATION OF NEPHELOMETRY TO THE MONITORING OF AIR POLLUTION SOURCES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 19p., 1974. 10 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-110.)*

The development of a nephelometer sensor suitable for stack monitoring is described. The basic design utilizes a hardened sampling chamber and a thermally isolated package containing the optics and electronics. The instrument is calibrated by comparison to a precision 1.5 m pathlength transmissometer for dense aerosols and an integrating nephelometer for dilute concentrations. The transmissometer is calibrated with neutral density filters and the nephelometer is calibrated with gases of known scattering coefficient. The calibration system is a closed loop consisting of a smoke generator, followed by an aging chamber, the transmissometer of nephelometer, a short coupling to the Plant Process Visiometer, and a blower. The calibrator is adjusted to a scattering coefficient of 0.55/m as determined by both the transmissometer and the nephelometer. By fixing the scattering coefficient of the instrument calibrator, the reliability of the sensor is vastly enhanced. A prototype instrument was installed in a diatomaceous earth processing plant for over a year. This particular source was chosen because the dust would stress both the sampling system and sensor because it is white and tends to clog sampling lines. It performed satisfactory during the first phase of testing. (Author abstract modified)

44961 **APTIC NO. 65567**

Griggs, Michael

MEASUREMENTS OF ATMOSPHERIC AEROSOL OPTICAL THICKNESS USING ERTS-1 DATA. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1974. 18 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-239.)*

Satellite techniques for environmental monitoring are described. The apparent gradual increase of particles in the atmosphere has received much attention in recent years due to possible effect of atmospheric aerosols on the earth s climate. The ERTS-1 satellite monitors the atmospheric aerosol optical thickness on a global basis and shows a linear relationship between the upwelling earth-atmosphere radiance and aerosol optical thickness. This relationship was investigated at two sites, San Diego and the Salton Sea, using the MSS radiance data, with ground-truth observations of the aerosol optical thickness being made with a photometer at the time of the satellite overpass. Significant results, relating the radiance over water surfaces to the atmosphere aerosol optical thickness have been obtained. The MSS channels centered at 0.55, 0.65, and 0.75 micron have comparable sensitivity, and the optical thickness can be determined within + or - 10% with the assumed measurement errors of the MSS.

44962 **APTIC NO. 65229**

Gruber, Charles W. and Gale Harms

FUGITIVE DUST MEASUREMENT BY THE ROTARY AMBIENT ADHESIVE IMPACTOR. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1974 15 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-85.)*

A hand powered rotary ambient adhesive impactor (RAAI) for short time grab sampling of fugitive dusts from non-confined sources is evaluated. The RAAI uses a small diameter circular target (approx. 1/4 inch dia.) to capture plus 20 micron particles by spinning the sampler at a fixed r.p.m. The volume sampled is a function of number of revolutions. Evaluation of the sample is by counting or comparative measurement. Efficiency of the instrument is presented. The construction of the RAAI is described and actual field measurements are included. Duplicate tests show good agreement. Several sources were measured: an interstate highway, a downtown street location, fly ash settling pond from a utility station, an asphalt paving facility, a parking lot, and a citizen shaking out a rug. All samples were one minute. Results are reported as particles/sq cm/min, with some of the data converted to concentrations as particles/cu m. The method is applicable to evaluating fugitive dust from non-confined sources. (Author abstract modified)

44963 **APTIC NO. 65472**

Hamil, Henry F. and Richard E. Thomas

COLLABORATIVE STUDY OF METHOD FOR THE DETERMINATION OF PARTICULATE MATTER EMISSIONS FROM STATIONARY SOURCES (FOSSIL FUEL-FIRED STEAM GENERATORS) (FINAL REPORT). *Southwest Research Inst., San Antonio, Tex., Environmental Protection Agency Contract 68-02-0623, Program Element 1HA327, ROAP 26AAG, Rept. EPA-650/4-74-021, Rept. SwRI 01-3487-01, 40p., June 30, 1974. 6 refs.*

NTIS: PB 234150/AS

Method 5, a test procedure for determining particulate emissions specified in the Environmental Protection Agency s Standards of Performance of New Stationary Sources, was tested, and results are presented. Method 5 specifies that particulate matter be withdrawn isokinetically from the source and its weight be determined gravimetrically after the removal of uncombined water. The test was conducted at a fossil fuel-fired steam generating power plant using four collaborating laboratories. Sixteen sample runs were made over a 2-week period by the collaborators for a total of 63 individual determinations. The reported values of one of the laboratories were not included in the analysis because the determinations were not representative of Method 5 results. Of the remaining determinations, one was eliminated due to failure to maintain isokinetic conditions. The remaining values were subjected to statistical analysis to estimate the precision that can be expected with field usage of Method 5. The estimated within-laboratory standard deviation was 31.1% of the mean standard deviation determination with 34 degrees of freedom; the estimated between-laboratory standard deviation was 36.7% with two degrees of freedom; the laboratory bias standard deviation was 19.5%. The precision estimates reflected operator and source variability. The results were obtained from a single test using data from three collaborators.

44964 **APTIC NO. 65473**

Hamil, Henry F., David E. Camann, and Richard E. Thomas

THE COLLABORATIVE STUDY OF EPA METHODS 5, 6, AND 7 IN FOSSIL FUEL-FIRED STEAM GENERATORS FINAL REPORT. *Southwest Research Inst., San Antonio, Tex., Environmental Protection Agency Contract 68-02-0623, Program Element 1HA327, ROAP 26AAG, Rept. EPA-650/4-74-013, Rept. SwRI 01-3487-001, 40p., May 1974. 7 refs.*

Results are given of collaborative testing in fossil fuel-fired steam generators of Method 5 for particulate emissions, Method 6 for sulfur oxide emissions, and Method 7 for nitrogen oxide emissions as given in the Environmental Protection Agency s Standards of Performance of New Stationary Sources. Once the methods were judged suitable for collaborative testing, the methods were collaboratively tested to determine, to the extent possible, the accuracy and precision of each. Attempts were made to design the collaborative test plans and ancillary tests to allow determination of the sources of variability by suitable statistical analytical techniques. By obtaining the information on accuracy and precision for each method, assessment of the reliability and acceptability of the method for field testing could be made; the relative weak and strong points of the methods could also be made; and recommendations for method modifications to enhance precision could be made. The accuracy of Method 7 could not be adequately demonstrated. The estimated within- laboratory standard deviation was 6.56% of the mean standard deviation determinations with 96 degrees of freedom; the estimated between-laboratory standard deviation was 9.49% with three degrees of freedom; a laboratory bias standard deviation of 6.58% was estimated. For Method 6 these values were, respectively, 4% with 96 degrees of freedom; 5.8% with three degrees of freedom; and 4.19%. For Method 5 these values were, respectively, 31.07% with 34 degrees of freedom; 36.68%, with two degrees of freedom; and 19.50%.

44965 **APTIC NO. 65474**

Hamil, Henry F. an/d Richard E. Thomas

COLLABORATIVE STUDY OF METHOD FOR THE DETERMINATION OF PARTICULATE MATTER EMISSIONS FROM STATIONARY SOURCES (MUNICIPAL INCINERATORS) (FINAL REPORT). *Southwest Research Inst., San Antonio, Tex., Environmental Protection Agency Contract 68-02-0626, Program Element 1HA327, ROAP 26AAG, Rept. EPA-650/4-74-022, Rept. SwRI 01-3462-002, 40p., July 1, 1974. 8 refs.*

NTIS: PB 234151/AS

A collaborative test of Method 5, a test procedure promulgated by the Environmental Protection Agency for the determination of particulate emission levels from stationary sources, is described. Method 5 specifies that particulate matter be withdrawn isokinetically from the source and its weight be determined gravimetrically after removal of uncombined water. The test was conducted at a municipal incinerator using four collaborative teams. A total of 12 runs were made over a 2-week period, and 47 individual concentration determinations were made by the four collaborators. From these, the values which conformed to the standards of 60 scf of gas collected and + or - 10% of the isokinetic sampling were used in the analysis. The working sample was 11 runs and a total of 32 individual observations submitted to statistical analysis to obtain precision estimates for Method 5. The precision was expressed in terms of within-laboratory, between-laboratory, and laboratory bias components. For purposes of statistical treatment, the determinations were grouped into blocks. Two separate furnace trains were used at the incinerator, No. 1 during the first week of testing, and the No.2 during the second. The values obtained from each stack were grouped as a block for this test. The statistical analysis was based on the assumption that the true emission concentration remains essentially constant over the course of each week s runs. No independent method for determining the concentration was available during the test to substantiate this assumption, but a preliminary statistical test detected no significant differences among the runs that would indicate a changing mean value over the test period. The estimated within-laboratory standard deviation was 25.3% of the mean standard deviation of the Method 5 determinations with 24 degrees of freedom; the estimated between-laboratory standard deviation was 38.7% with three degrees of freedom; the laboratory bias standard deviation was 29.3%. (Author summary modified)

44966 **APTIC NO. 68076**

Herrick, R. A., H. S. Kinsman, J. Lodge, D. Lundgren, C. Phillips, W. C. Rutledge, R. S. Sholtes, E. Stein, J. J. Stukel, and J. Wagman

TENTATIVE METHOD FOR DETERMINATION OF THE SIZE DISTRIBUTION OF ATMOSPHERIC PARTICULATE MATTER BY WEIGHT (CASCADE IMPACTOR METHOD). *Health Lab. Sci., 11(4):326-335, Oct. 1974. 25 refs.*

A tentative method for the determination of the size distribution of atmospheric particulate using a cascade impactor is described. Particles having inertia greater than a critical value are selectively removed from an air stream at each of the stages of the multi-stage inertial impactor. Particle size data obtained with the impactor are best interpreted and expressed in terms of equivalent or aerodynamic size, with the equivalent size of any particle regardless of its shape or density being defined as the diameter of a unit density sphere having the same settling velocity as the actual particle when subjected to a gravitational or centrifugal force field. Cascade impactors are best suited to the determination of parucle size distributions for aerosols having mass median diameters between 0.5 and 5 micron. Interferences are mainly operational problems caused by insects, lint fibers, or other extraneous objects which block part of the sampler inlet or part of the impactor nozzle. Condensation of water or other vapors from the collection surface can also be interferences. The overall accuracy of the method is limited to about + or - 10% under ideal operating conditions.

44967 **APTIC NO. 68097**

Herrick, Robert A.

SOURCE SAMPLING FOR MASS EMISSIONS OF PARTICULATE MATTER: A STATE-OF-THE-ART REPORT. *Health Lab. Sci., 11(4):366-370, Oct. 1974. 19 refs.*

The state-of-the-art regarding the sampling of particulate matter, including in-stack concentrations, is reviewed. Although several established methods are available for measuring the particulate content of stack gases at stack conditions, there is no fully satisfactory source measurement since particulate matter is not adequately defined in terms of temperature and pressure specificity of the sampled stack gas. The Environmental Protection Agency s front half method is a specific method using arbitrary pressures and temperatures and is also a repeatable method which can be used to check emission levels against a numerical standard since it correlates directly with neither control equipment engineering data nor ambient air quality measurement. There are currently no fully adequate methods for measuring the condensible fraction of point source particulate emissions; the Greenburg-Smith impinger is unsatisfactory because of its low particulate collection efficiency in the sub-micron range and the possible absorption of gases. (Author summary modified)

44968 **APTIC NO. 65271**

Howes, J. E., Jr., R. N. Pesut, and J. F. Foster

INTERLABORATORY COOPERATIVE STUDY OF THE PRECISION AND ACCURACY OF THE DETERMINATION OF THE RELATIVE DENSITY OF BLACK SMOKE (RINGELMANN METHOD) USING ASTM METHOD D 3211-73 T. (FINAL REPORT). *American Society for Testing and Materials, Philadelphia, Pa., DS 55-S10, 52p., Aug. 1974. 13 refs.*

Results obtained from an experimental study of the accuracy and precision of estimates of the relative density of black smoke using the ASTM Method D 3211-73T (Ringelmann Method) are described. The average standard deviation (Sb) for variations among single black smoke density estimates by different observers (reproducibility) over the Ringelmann number range of 0 to 5 is expressed by the equation Sb equals 0.1 + 0.3 M - 0.07 M squared, where Sb and M (the mean smoke density) are given in Ringelmann numbers. There did not appear to be a significant difference between the reproducibility of observer estimates of generator- produced smoke plumes and emissions from actual sources. The overall mean of observer estimates of smoke density were less than the smoke-generator tranmissometer readings by about two percentage points, a difference which was statistically indistinguishable from zero. The observer-transmissometer difference showed no dependence on smoke density over the entire Ringelmann range; in general, observer estimates across the entire Ringelmann range were within 10% of generator readings. A significant bias was noted only at Ringelmann readings greater than 3.5. (Author summary)

44969 **APTIC NO. 65425**

Howes, J. E., Jr., R. N. Pesut, and J. F. Foster

FINAL REPORT OF INTERLABORATORY COOPERATIVE STUDY OF THE PRECISION OF THE DETERMINATION OF THE AVERAGE VELOCITY IN A DUCT (PITOT TUBE METHOD) USING ASTM METHOD D 3154-72. *Battelle Memorial Inst., Columbus Labs., Columbus, Ohio, American Society for Testing and Materials Rept. D555-57, 05-055070-17, 60p., Aug. 1974. 12 refs.*

Results are presented of an experimental study of the precision of measurements of the average velocity of stack gases using American Society of Testing and Materials Method D 3154-72 (Pitot Tube Method). The study was performed in conjunction with evaluation of methods for measurement of particulates and collected residue in source emissions. A statistical analysis was made of 163 average velocity determinations using the ASTM method cited by nine different laboratories at four different field locations. The standard error of variations among single determinations by different laboratories, S sub T (between- laboratory), over the velocity range of about 30 to 130 feet per second may be estimated by the equation S sub T (between- laboratory) equals 0.21 square root of m, where S sub T and m, the mean velocity, are expressed in ft/sec. The precision of average velocity measurements is highly correlated with the variability in velocity pressure readings. Variability of gas moisture content and gas temperature measurements are reported. However, rather large coefficients of variation, up to about 7% in gas temperature and 90% in gas moisture in extreme cases, did not significantly affect the precision of the average velocity measurements. (Author summary)

44970 **APTIC NO. 64975**

Ichihara, Akira

SHORT-CUTS FOR MEASUREMENT AND ANALYSIS. *(Keisoku bunseki ni okeru shoryokuka). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 26(7):21-25, July 1974.*

A general discussion is given for automatic continous measurements of air pollutants. Magnetic oxygen and zirconia O2 meters are both widely employed for their reliability; the zirconia O2 meter is especially efficient in the measurement of low O2 concentration. The most common methods for continous monitoring of sulfur dioxide are infrared, ultraviolet and solution conductivity methods. Operators generally prefer IR and UV methods to the solution conductivity method which requires the preparation of solution. Physical methods such as flame photometric detection and IR for nitrogen oxides; IR, UV, and radiation absorption for carbon monoxide and sulfur in oil; and the light scattering method for dusts are widely adopted methods, now replacing chemical method. A new trend in sampling is the development of single sampler for simultaneous sampling of O2, SO2, NOx, and CO. Equations for the calculations of SO2 emissions and total flue gas emission are also given.

44971 **APTIC NO. 65599**

Isawa, Yasukazu, Taisuke Ogawa, Hiroyasu Otani, Harumoto Ando, Kizuna Suzuki, Shotaro Nishimura, and Chiyoe Yamanaka

LASER RADAR SYSTEM FOR METEROLOGICAL OBSERVATIONS. *(Taiki kansokuyo reza reda shisutemu). Text in Japanese. Preprint, Japan Society of Applied Physics, p. 56., 1974. (Presented at the Japan Society of Applied Physics, Joint Meeting, 21st, Kawagoe, Japan, April 1-4, 1974, Paper 3a-A11.)*

For lower altitude air quality observations, an online lidar based in Mie scattering was designed and almost completed.

This system comprises a fixed monitoring station and a mobile monitoring vehicle, and the two are connected for the purpose of systematic analysis of air pollution covering large areas. A servomechanism establishes the lidar angle and the direction angle. The angle signal is sent to the computer and a laser beam is sent out. After sampling and AD conversion, the result is measured. The recoreded data is sent out. After sampling and AD conversion, the result is measured. The recorded data is sent online to the computer at the fixed station. In the mobile monitoring station, an offline output is recorded on paper tape. The computer reads the laser radar equations and calculates the measurement of scattering cross section at each sampling location and puts it into the magnetic drum. The space distributions of air qualities are expressed on the monitor in the form of THI, RHI, or PPI. Repeated laser emission is possible down to 0.2 pps, and in a mobile station, to 0.1 pps. Presently, augmentation of observation distance is being studied by photoelectric amplification imprint time change.

44972 **APTIC NO. 65651**

Ishiguro, Tatsukichi

ANALYSIS AND MEASUREMENT PROBLEMS AT AIR POLLUTANT EMISSION SOURCES. *(Taiki osen hasseigen ni okeru bunseki sokutei no mondaiten). Text in Japenese. Kagaku Kojo (Chem. Factory), 18(6):58-60, June 1974.*

The significance of numerical values, derivation conditions, measurement methods and accuracy of measurement must be considered in the evaluation of air pollution conditions at emission sources. For the measurement of pollutants in combustion exhaust gas, for example, variables such as temperature, air ratio (e.g., oxygen and carbon monoxide ratio), fuel consumption rate, and volume of exhaust gas should be measured simultaneously. The filter, material of collecting pipe, heating method, pretreatment of samples, coexisting compounds, and measuring time are some other factors affecting the result. More than 15 analytical instruments for the measurement of air pollutant concentration are described in the Japanese Industrial Standards. Using two infrared spectrometers by different manufacturers, a flame photometer, and a coulometer, the sulfur dioxide concentration at one refuse treatment plant was measured simultaneously at the same measuring point for a period of 10 days. The lowest and highest SO2 concentration (ppm) at one given day varied as much as 10 to 31 and 32 to 78, depending on the type of instrument used. The measurement using a standard gas sample varied from 8 to 12 ppm. To obtain reliable numerical values, the measuring method must be suited to the individual situation.

44973 **APTIC NO. 65459**

Jackson, M. L., S. Chimonas, and R. G. Patterson

SAMPLE COLLECTION OF SOLID AND LIQUID AEROSOLS BY SONIC-FLOW IMPINGEMENT. *Preprint, American Inst. of Chemical Engineers, 17p., 1974. 13 refs. (Presented at the American Institute of Chemical Engineers, National Meeting, 76th, Tulsa, Okla., March 10-13, 1974.)*

Methods for the simplified collection of submicron particles by wet and dry impingement using sonic- and supersonic-flow nozzles were extended to include solid and liquid aerosols in sizes down to 0.12 micron. Four impinger designs were used: two constant acceleration, sonic- and supersonic-flow models, one hole with 1/16-inch throats, and two sonic- and supersonic-flow models of simple construction, each containing four holes with 1/32-inch throats. Collection efficiencies depended upon the nature of the aerosol and the impingement surface. Dry impingement of liquid aerosols of dioctyl phthalate using the four-hole sonic model showed near 100% collections for 0.5 and 0.3 micron particles, 87% for 0.18 micron, and 44% for 0.12 micron. The one-hole, larger diameter models showed lower collection efficiencies. For either hole size, the supersonic models gave little or no improvement. Dry collection of three sizes of polystyrene latex microspheres showed considerable reentrainment and lower collection efficiencies from elastic collisions with the impingement surface. For example, collections by the one-hole, supersonic impinger were 77, 43, and 24% for 0.48, 0.31, and 0.18 micron size microspheres, respectively. Use of greased aluminum foil disks increased collection efficiencies to 82, 96, and more than 90%, respectively; the addition of water to the collection flask gave collection efficiencies of 95, 94, and 80%, respectively. Efficiencies were mostly the same or higher for the four-hole sonic-flow nozzles, indicating that the simpler, multiple small-hole design is the most satisfactory. The sonic-flow impinger does not require isokinetic flow for submicron particles. It is suitable for collection of fine liquid and solid particles and can be extended to soluble substances in the molecular state if a liquid is also employed. The collection efficiencies cited are conservative in that lower stage pressures, without the downstream filter, and closer plate spacings, both increase collection efficiencies. (Author abstract modified)

44974 **APTIC NO. 65608**

Kawado, Kenichi

ANALYZERS FOR ENVIRONMENTAL MEASUREMENTS, (I) AIR POLLUTION. *(Kankyo keisoku no tame no bunsekikei). Text in Japanese. Sekiyu to Sekiyu Kagaku (Petrol. Petrochem.), 18(3):66-69, 1974. 3 refs.*

Solution conductivity, amperometry, and flame photometric detector methods for measuring sulfur dioxide and a digital dust analyzer for airborne particulates are described. In the solution conductivity method, a hydrogen peroxide-sulfuric acid solution is used as absorbent. The formation of sulfuric acid by SO2 and H2O2 changes the conductivity of the solution, which is measured to give the SO2 concentration. The H2SO4 also acts as a stabilizer for H2O2. The existence of ammonia interferes with the measurement, therefore, exhaust gas having high NH3 concentration is treated with an oxalic acid scrubber. The amperometric (coulometric) method uses a bromine solution as a absorbent, in which bromine is reduced to bromide ions by SO2 ion. The SO2 concentration can be easily calculated by measuring the electrolytic current. Carbon dioxide, carbon disulfide, sulfur trioxide, NH3, and hydrogen chloride interfere with the measurement. A flame photometric detector is based on the fact that SO2 decomposes in hydrogen flame and light produced near 394 nm is detected by electronic amplifier. The digital dust meter is based on the Mie light scattering method. Pause height and number are used to calculate particle size and number.

44975 **APTIC NO. 65570**

Klingenberg, Horst, Martin Fock, Karl-Heinz Lies, and Laszlo Pazsitka

A CRITICAL STUDY OF THE UNITED STATES EXHAUST EMISSION CERTIFICATION-TEST-ERROR ANALYSIS FOR THE TEST PROCEDURE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 24p., 1974. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-242.)*

The U. S. Regulations concerning the automobile exhaust emissions lay down the limits of the individual pollutants that must not be exceeded, but make no allowance for measuring uncertainties when evaluating the test results, nor are the final results subjected to any form of statistical analysis. The knowledge of these uncertainties is very important as they determine the risk of the certification test. The individual uncertainties consist of the measuring errors that result from random errors and the recognized systematic errors that have not been precisely defined, but can be estimated. Corrections have to be made for recognized systematic errors that can be quantitatively defined (for instance by correlation tests). For the CVS (constant volume sampler) Test Procedure related to 1975 the uncertainties for various influencing factors and item of apparatus have been determined quantitatively whenever possible, and failing this, have been estimated. At the same time, possible methods (e.g., multiple variance analysis) of determining the various influencing factors experimentally (in particular, driver, dynamometer and test vehicle) are described. The current practice of measuring emissions for certification once at the manufacturers and once at the Governmental laboratories should be replaced by multiple tests with different drivers on different dynamometers and different measuring equipment to reduce the overall measuring uncertainties. Unrecognized systematic errors are discussed. Results of correlation tests on several laboratories, including the Environmental Protection Agency and the California Air Resources Board have shown big systematic errors. Such systematic errors have to be avoided by performing correlation tests which should be required by law and specified in the Federal Register.

44976 **APTIC NO. 68094**

Kneip, T. J., R. S. Ajemian, J. R. Carlsberg, J. Driscoll, L. Kornreich, J. W. Loveland, J. L. Moyers, and R. J. Thompson

TENTATIVE METHOD OF ANALYSIS FOR ELEMENTAL MERCURY IN AMBIENT AIR BY COLLECTION ON SILVER WOOL AND ATOMIC ABSORPTION SPECTROSCOPY. *Health Lab. Sci., 11(4):342-346, Oct. 1974. 6 refs.*

A tentative method for the atomic absorption analysis of elemental airborne mercury in concentrations of 0.02-10 micrograms/cu m at a collection flow rate of 100-200 cu cm/min over a 24-hour period and with a lower limit of detection of about 0.001 micrograms of Hg is described. Elemental Hg is collected on silver wool and released by heating the wool at 400 C. The released Hg is swept by a carrier gas through an absorption cell of an atomic absorption spectrometer, and the response at 253.7 nm is measured either as a peak height or peak area. Recovery of the Hg from the silver wool collectors by the method is at least 98% over the range of 0.006-0.6 micrograms with a relative standard deviation of 4%. Precision of the method is reportedly about 10% relative standard deviation for ambient Hg vapor concentrations of about 0.3 micrograms/cu m. High levels (microgram quantities) of chlorine and sulfur dioxide will poison the silver wool collectors, and hydrogen sulfide in concentrations above 13 micrograms/cu m may also show an interference. A tube packed with ascarite, preceding the collector, will remove the chlorine.

44977 **APTIC NO. 65409**

Kovar, Vlastislav and Jitka Hrda

COMPARISON OF THE RESULTS OF PARALLEL SO2 CONCENTRATION MEASUREMENTS. *(Porovnani vysledku paralelnich mereni imisi SO2). Text in Czech. Chem. Prumysl (Prague), 24/49(3):140-142, 1974. 8 refs.*

The atmospheric sulfur dioxide concentrations were determined at a station in Northern Bohemia, using various colorimetric, volumetric, polarographic-coulometric, turbidimetric, and conductivity methods. The results were not consistent, due to differences in selectivity, sensitivity of the methods, and sensitivity to other pollutants. Statistical methods showed some correlation between some of the analytical methods but these correlations depended on seasonal variations. It will be necessary to repeat these comparative tests over longer periods of time, in order to determine the most reliable.

44978 **APTIC NO. 68073**

Kubo, Uichi, Seiichiro Nakanishi, and Mitsuo Takaoka

BASIC STUDIES ON AIR POLLUTION MEASUREMENT BY LASER. *(Reza ni yoru taiki osen sokutei no kiso kenkyu). Text in Japanese. Kinki Daigaku Kogai Kenkyusho Kenkyu Hokoku (Kinki Univ. Pollut. Res. Inst. Res. Rep.), no. 2:111-116, Oct. 1974. 3 refs.*

For the development of small-scale, low cost laser instruments for atmospheric measurement, the atmospheric propagation properties of a laser beam were studied. The variation in intensity distribution in the diametral direction of the laser beam spot in the range of 1-120 m was measured. In the case of direct irradiation, the increase rate in beam diameter was 1.2 mm/m for helium-neon at 0.633 micron, 1.5 mm/m for argon at 0.488 micron, and 3.3 mm/m for ruby at 0.694 micron. The parallelism of the gas laser is superior compared to that of the ruby laser. In the range further than 40 m and transmittancy less than 10%, the decrement coefficient can be considered constant, and was 12.6/km for He-Ne and 15.4/km for Ar. In this range the transmittancy of the He-Ne laser is higher than that of the Ar laser, and the use of the He-Ne laser is more effective for atmospheric measurement.

44979 **APTIC NO. 64973**

Kubota, Isao

MEASUREMENT OF DIESEL EXHAUST CARBON WEIGHT. *(Dizeru haiki kabon juryo no sokutei ni tsuite). Text in Japanese. Preprint, Japan Society for Mechanical Engineering, p. 75, 1974. 4 refs. (Presented at the Japan Society for Mechanical Engineering, Hamamatsu Meeting, Sept. 2, 1974.)*

The concentration of carbon in diesel exhaust gas can be indicated accurately if the carbon weight contained in unit volume of exhaust gas can be measured. However, no simple measurement method is known at present. From the weight of C adsorbed on filter paper, the weight concentration can be calculated if the permeability of filter paper is known. Using a filter paper dustmeter, the C weight was determined by measuring the weight of filter paper before and after passing the exhaust gas. The C contained in 1 l of exhaust gas was minimal, however, by the repeated passing of exhaust gas, 30-60 times, the C adsorbed on filter paper could be weighed. The C weight per filter paper g is indicated by g equals G/nN, where G is total carbon weight, n is number of filter papers, and N is number of passings of exhaust gas. The relationship between the C weight and filter paper concentration (per one filter paper, per one passing of exhaust gas) can be expressed by an empirical formula. The weight measurement of filter paper is greatly affected by the moisture in air; however, the hygroscopicity of filter paper is unaffected by the exhaust gas at temperatures up to 300 C.

44980 **APTIC NO. 65692**

Louw, C. W.

THE IDENTIFICATION OF POLYNUCLEAR HYDROCARBONS IN THE AIR OF SOUTH AFRICAN CITIES. *S. Afr. J. Sci. (Johannesburg), 70(1):24-27, Jan. 1974. 17 refs.*

A technique for the identification of polynuclear hydrocarbons and its application to a number of South African city air samples are described. The technique is based upon the separation of polynuclear hydrocarbons first as a class from other organic compound types by one-dimensional thin-layer chromatography and then separation of the individual polynuclear hydrocarbon members by two-dimensional thin-layer chromatography. Identification of the separated components is based upon their thin-layer chromatographic values and the ultraviolet spectra of their extracts. Direct in situ spectrophotofluorometry was applied to confirm the presence of benzo(a)pyrene. This technique is more versatile, efficient, and sensitive than a column chromatographic/ultraviolet spectrometric technique. The new technique was used to identify o-phenylene-pyrene, 4-methyl-pyrene, 3,4,9,10 dibenzopyrene, and 1,2,4,5 dibenzopyrene. All polynuclear hydrocarbons identified constitute only about 30% of those components visible on the two dimensional thin-layer chromatograms of South African city air samples. (Author conclusions modified)

44981 **APTIC NO. 65176**

Maruyasu, T.

THE ENVIRONMENTAL INVESTIGATION BY REMOTE SENSING. *(Rimouto sensingu ni yoru kankyo chosa).*

Text in Japanese. Kankyo Sozo (Environ. Creation), 4(1):56-61, Jan. 1974.

Remote sensing from space or from airplanes is effective in measuring air pollution. The remote sensing is a new technique to get information about an object from a long distance, without touching the object. A light wave or a microwave plays an important role in this technique. Remote sensing consists of three techniques: from space, from airplanes, and observations on the ground. By the remote sensing from space, information from a wider region is given in one picture. Moreover, this technique is characterized by repeatedly taking a photography periodically. But the picture itself is worse than an air photograph and is very often obstructed by clouds. Furthermore, the amount of data becomes immense and must be analyzed with the help of a computer. It is necessary to take one group of data from each observation from space, airplane, or ground level to recognize the value. The multispectrogram is used as a remote sensing method, and the ERTS(Earth Resources Technology Satellite) plan and Skylab plan are being developed.

44982 **APTIC NO. 65708**

Masek, Vaclav

FLY DUST MEASUREMENTS ON THE WORKING PLACES OF THE TAR AND PITCH INDUSTRY. *(Flugstaubmessungen am Arbeitsplatz der Teer- und Pechindustrie). Text in German. Bitume, Teere, Asphalte, Peche, (25(2):64-67, 1974. 3 refs.*

For fly dust measurements in the atmosphere of the tar and pitch industry, a Sigrist light extinction analyzer and two fine dust filters were used. The first of the two filters has a microcyclone which separates the coarse dust and a fiber filter for the respirable dust. The second filter unit comprises a cyclone and fiber filter. First with each of the two filters 94 samples were drawn at six selected points. The average quantity of total dust determined with the microcyclone was on the average 2.1% by weight higher than that determined for the other samples; for respirable dust it was 3.2% by weight higher. The microcyclone was better at separating coarse and fine dust. The grain size and its quantitative distribution was determined with a granulometer. With this unit, particles are first suspended in electrolytic solution. From this suspension, samples of certain volume are drawn through a nozzle where a powerful electric field exists. Upon passage of one particle, the electric resistance at the nozzle changes for a short moment. This change is proportional the particle volume. It is converted into a voltage impulse and made visible on an oscillograph. The number of impulses is counted and recorded. Particle sizes up to 1.8 micron could be determined. At 42 points simultaneous comparative measurements were taken with the light extinction unit, the microcyclone, and the cyclone/fiber filter. A linear relationship was found for the results from all three units. The light extinction analyzer yielded 10.5% lower values than the microcyclone and 11.2% lower values than the cyclone/fiber filter. The benzo-3,4-pyrene concentration in the respirable dust fraction was determined by chromatography. Scanning electron microscope pictures of the smallest, as well largest, respirable dust particles are presented.

44983 **APTIC NO. 65250**

McCain, Joseph D., Kenneth M. Cushing, and Wallace B. Smith

MEASUREMENT OF THE FRACTIONAL EFFICIENCY OF POLLUTION CONTROL DEVICES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 32p., 1974. 22 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-117.)*

The measurement of the fractional efficiency of pollution control devices is described and evaluated. Cascade impactors, diffusion batteries with condensation nuclei counters, and optical counters were used to cover the particle size range from 0.01 to 10 micron in diameter. Each of these methods has limitations when used in the field. Cascade impactors are prone to overloading and reentrainment. Particle concentrations are frequently too high for optical counters and condensation nuclei counters, and dilution is required. The particle shape, index of refraction, and density may be unknown. Condensation, coagulation, and diffusional losses can be serious problems in extractive sampling. Efforts were made to overcome or minimize the problems associated with fractional efficiency measurements, and results are presented for two electrostatic precipitators and a novel steam hydro-scrubber. No single particle size measuring device was suitable for both fine and ultrafine particle sizes. A combination of several devices was successfully used to measure particle size distributions and fractional efficiencies from 0.005 to 10 micron diameter. (Author abstract modified)

44984 **APTIC NO. 65721**

Melzer, Werner

PROBLEMS OF AUTOMOTIC TRACE GAS MEASUREMENT FOR WASTE GAS AND INDOOR AIR MONITORING IN CHEMICAL PRODUCTION PLANTS. *(Probleme der automatischen Gasspurenmessung bei der Abgas-und Raumluft-Ueberwachung in chemischen Produktionsanlagen.) Text in German. Chem.-Ingr.-Tech., 46(11):461-466, 1974. 8 refs.*

Difficulties with sampling and analysis of trace gases are discussed with examples such as the measurement of chlorinated hydrocarbons in indoor air, the determination of chlorine in the gas at the exit of a waste gas scrubber and the measurement of phosgene traces for indoor air and emission monitoring. For the measurement of Cl2 traces in the range from zero to 5 vol. ppm in a gas which has been cleaned with sodium hydroxide in a scrubber the ionoflux analyzer was selected. The unit operates with aqueous and sulfuric acid-acidified arsenic trioxide solution whose conductivity increases upon entry of Cl2. The measurement gas must be passed to the analyzer with a slight overpressure. The calibration curve is largely linear. Interference by sulfur dioxide posed no difficulty since this gas was not present. The analytical process itself therefore caused no difficulty in this case. Sampling posed greater difficulties. A simple sampling system consisting of a corrosion resistant membrane pump, a separator of glass and a 50 m long heated 6 times one 1 mm hose had to be modified because fine NaOH droplets penetrated the sampling system and covered the walls of the separator and the hose providing an excellent Cl2 absorbing NaOH layer. A novel measuring gas preparing unit was installed ahead of the sampler therefore to obtain NaOH free gas. A ventilator made of rigid polypropylene (PPH) draws on 20 cu m of waste gas per hour from the tower and passes it via a 1 m long and 50 mm thick PPH hose tangentially to the centrifugal separator of PPH with a volume of about 3 liters. The measurement gas is conducted downward by a spiral guide vane and leaves at the bottom again tangentially. The waste gas now liberated from NaOH droplets and water goes to the analyzer by way of the 50 m long heated hose.

44985 **APTIC NO. 68060**

Miyamoto, Satoru

NOX ANALYZER FOR FLUE GASES BY THE POTENTIOSTATIC METHOD. *(Teiden-i denkaiho ni yoru endo haigasu yo NOx bunseki kei ni tsuite). Text in Japanese. Boira Gishi (Boilermen), 29(3): 206-213, March 1974.*

The potentiostatic method, or thin film or oxidation-reduction method, is now widely used for portable analyzers for nitrogen oxides. The nitrogen oxide in the sample gas, which has diffused through a membrane accommodated in the sensor, is oxidized in a particular electrolyte and then determined by the diffusion current, which is proportional to the concentration of each gaseous component. The standard oxidation potentials of nitric oxide and nitrogen dioxide are 0.96 and 0.80 V, respectively. The specifications of an analyzer are as follows: measurable regions, 0-200, 0-500, 0-2000 ppm; the flow rate of sample gas, 0.5 l/min; accuracy, 2% of the full scale; electrical source, AC 100 V, 50-60 Hz, 10 VA; weight, about 5 kg; dimensions, 280 by 220 by 280 mm. Ambient temperature, 0-40 C. Sulfur dioxide gas should be eliminated before the determination. Copresence of carbon monoxide is troblesome, which is often the case in incomplete combustion of fuels. When the CO content exceeds several percent, reliability of the experimental data is completely lost. The copresence of water vapor, ozone, carbon dioxide, and formic acid do not present problems. The sensitivity ratio of the gases NO and NO2 was 1:0.75.

44986 **APTIC NO. 68091**

Nagasaki, Mamoru, Ryoji Udo, Tatsuya Nakashima, Yoshikazu Hatanaka, and Tatsuo Hitomi

MEASUREMENT OF NITROGEN OXIDES BY A SIMPLIFIED AIR SAMPLER. *(Chisso sankabutsu kani taiki saishu sochi ni yoru sokutei ni tsuite). Text in Japanese. Preprint, Japan Environmental Hygiene Center, Fukui, p. 75-79, 1974. (Presented at the Japan Environmental Hygiene Center, Conference on Environmental Health, 18th, Fukui, Japan, Oct. 3-4, 1974, Paper 3.)*

A simplified system for measuring nitrogen dioxide in the atmosphere is presented. The NO2 was trapped in a bubbler setup, and reacted with the Saltzman reagent. The effective absorption was better than 93.9%. The NO2 concentrations obtained by this method were consistently higher (about 6.9%) than those values obtained by automatic samplers. The ease and economy of operation recommend it for taking the great number of air samples necessary in urban situations. Concentration distribution maps for NO2 in the Tokyo area during 1973-1974 are included.

44987 **APTIC NO. 68127**

Nomine, M. and R. Mallet

CRITICAL EXPERIMENTAL STUDY OF METHODS FOR THE DETERMINATION OF NITROGEN DIOXIDE AND NITRIC OXIDE ON THE BASIS OF THE GRIESS- ILOSVAY REACTION. APPLICATION TO EMISSION MEASUREMENT. *(Etude experimentale critique des methodes de dosage de l oxyde azotique et du peroxyde d azote basees sur la reaction de Griess-Ilosvay. Application aux mesures a l emission). Text in French. Riv. Combust., 28(5):163-172, 1974. 13 refs.*

Saltzman s method based on the Griess-Ilosvay reaction for the determination of nitric oxide and nitrogen dioxide was improved by providing for simultaneous conversion to nitrite and absorption in the Saltzman reagent. Mixtures containing known quantities of NO2 were used for the experiments. For an initial mixture composed of nitrogen and nitric oxide, the rate of conversion to nitrite was found to equal 1 when oxidation to NO2 and absorption in the Saltzman reagent were simultaneous. A similar rate of conversion was obtained for 1% sodium hydroxide as absorbent liquid. In the reaction of a mixture of nitrogen and NO2 with Saltzman s reagent or sodium hydroxide, the conversion rate was but about 0.66. Here, the conversion appeared to be limited by parasitic reactions with Saltzman s reagent, e.g., photochemical reaction or decomposition of NO2 in the presence of water and by dismutation reaction in sodium hydroxide. In mixtures of nitrogen, NO, and sulfur dioxide the latter did not interfere with the reaction with the Saltzman reagent in concentrations lower than 0.5 micrograms/cu m. The interference due to higher SO2 concentrations could be minimized by the addition of acetone to the Saltzman reagent.

44988 **APTIC NO. 68118**

Sawicki, E., P. R. Atkins, T. Belsky, F. A. Friedel, D. L. Hyde, J. L. Monkman, R. A. Rasmussen, L. A. Ripperton, J. E. Sigsby, and L. D. White

TENTATIVE METHOD OF ANALYSIS FOR POLYNUCLEAR AROMATIC HYDROCARBONS IN AUTOMOBILE EXHAUST. *Health Lab. Sci., 11(3):228-239, July 1974. 8 refs.*

A method is described for analyzing polynuclear aromatic hydrocarbons in automobile exhaust gas by gas chromatography and ultraviolet absorption spectrophotometry. The exhaust tar samples are prepared as a solution in a saturated hydrocarbon such as cyclohexane. Carbon-14 labeled benz(a)anthracene and benzo(a)pyrene internal standards are added and the sample extracted with caustic. Chromatographic fractionation on deactivated alumina provides a concentrate of polynuclear aromatic (PNA) hydrocarbons. An aliquot is injected into a gas chromatograph and eluted fractions trapped for measurement of individual PNA by ultraviolet spectrophotometry. The effluent from the gas chromatograph is split 15% to a flame ionization detector and 85% to an ice-cooled trap. Based on the ultraviolet spectra, microgram quantities of the various PNAs are next calculated. From 0.025 to 1.0 g of tar in 25-50 ml of solution can be handled by the method. The lower limit of determination for each PNA is 0.1 microgram. The concentration of individual PNAs in tar is in the range of 10-200 ppm. Interferences, precision and accuracy of the method, the apparatus, reagents, procedure, calibration and standards, and calculations are described.

44989 **APTIC NO. 68229**

Sekiuchi, Teruo, Kaku Kikuchi, and Mitsu Sone

RAPID QUANTITATIVE ANALYSIS OF FLUORINE IN PLANT. PART 2. *(Shokubutsutai chu fusso no jinsoku teiryo ni tsuite dai ni ho). Text in Japanese. Miyagiken Kogai Gijutsu Senta Hokoku (Miyagi Prefect. Pollut. Contr. Tech. Center Rep.), no. 2:37-40, April 1974. 4 refs.*

An ion selective electrode microanalytical method of determination of fluorine contained in plants was investigated. The sample plant was washed and dried in a vacuum dryer at 80 C for 4 hrs, and 5 g of the crushed sample was taken into a 300 ml flask and was carbonized with 0.5 g of quartz sand, 0.4 ml of perchloric acid, and 0.2 g of silver perchlorate at 130 C by 3 hr of reflux. By steam distillation, 200 ml of aqueous solution was obtained, of which 10 ml was mixed with 20 ml of TISAB (a buffer solution to adjust total ion strength). The electrostatic potential of the sample was measured 5 min later and fluorine concentration was determined by comparison with the calibration curve. It was found from the comparison of the results obtained by the present ion electrode method and the Alfusone colorimetric method that both methods gave the same results. Disturbance by metal ions on determination of fluorine concentration was checked. Addition of 0.1 and 1 mol of ferric ion to aqueous solution containing 0.5 ppm fluorine lowered apparent fluorine concentration by 15 and 70% respectively. Chlorine ion lowered the apparent fluorine concentration by 15% while other ions did not disturb the determination. The fluoride ion electrode method can be used as a practically useful microanalytical method for fluoride ion.

44990 **APTIC NO. 65248**

Severs, Richard K.

ATMOSPHERIC AEROSOL MEASUREMENTS FROM AIR OR SPACE PLATFORMS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1974. 17 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-115.)*

The feasibility of measuring atmospheric aerosol characteristics from air or space platforms utilizing remote sensors and ground based secondary reflectance targets was investigated. Secondary reflectance targets (bulk storage tanks) were located in the industrial area of Houston and near Galveston Bay. These areas experienced high and low ambient air aerosol mass loadings. Film/filter channels were used to define frequency bandwidths. Multi-channel remote sensor data were obtained by microdensitometry and used to calculate the aerosol extinction coefficient. These were 3.583 and 3.853 respectively. Houston and Texas air sampling network high volume suspended particulate data were used to generate computer isopleth maps of suspended particulates over the test site areas. On-site 5 hr high-volume measurements were also conducted to establish the mass loading of the atmosphere, 70 micrograms/cu m in the industrial section. In addition, a 5-channel nephelometer was used to collect data at the site. After demonstrating that the data best fit the Junge aerosol distribution, linear regression analyses were used to calculate the scattering coefficients, which were 1.997 and 1.422 respectively. (Author abstract modified)

44991 **APTIC NO. 65595**

Severs, Richard K.

SIMULTANEOUS TOTAL OXIDANT AND CHEMILUMINESCENT OZONE MEASUREMENTS IN AMBIENT AIR. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1974. 15 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 35.1.)*

Ambient air quality measurements taken by the total oxidant method and the chemiluminescent method are compared. The buffered potassium iodide method for measuring total oxidants and the chemiluminescent method for ozone were run simultaneously from August through December 1973, side by side at a site on the Houston ship channel. They were calibrated daily. Hourly averages were analyzed by linear regression and the confidence intervals were calculated, as well as confidence intervals for point estimates. These methods were used with all data sets with values greater than 10 ppb and again with values greater than 30 ppb. A regression line was also calculated for another set of data for the preceding year. These data were generated before a chromium trioxide scrubber was installed to eliminate possible chemical interferences with the KI method. The chemiluminescent method tends to produce values as much as two times higher than the simultaneous total oxidant values. An 80 ppb chemiluminescent ozone value predicted a value of 78 ppb total oxidant with a 95% confidence interval of 0.4 to 156 ppb. Statistical analyses confirmed that either measurement was a very poor predictor of the other. Enforcement of primary air quality standards with a reference method different than that used to establish the standard is thus questioned.

44992 **APTIC NO. 65594**

Shen, Thomas T. and Laurence G. Ayer

DETERMINATION OF SO2 EMISSION FROM OIL-COMBUSTION SOURCES BY FUEL ANALYSES AND SO2/CO2 RELATIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1974. 5 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-280.)*

Methods for the determination of sulfur dioxide emission from oil combustion sources by fuel analysis and SO2/carbon dioxide relations are described. Based on the theory presented, SO2 emission from stationary combustion sources can be estimated as 480s in ppm corrected to 12% CO2. This value should be adjusted proportionally if CO2 is other than 12%. A test program was conducted at four industrial utility power plants. Since not all sulfur compounds in heavy oil are converted to SO2, the emission factor of SO2 from test results of utility boilers was found to be 150S lb/cu 10 gal or 195 kg/cu 10 l. Experience shows the levels of SO2 emission can be determined based on generalized data correlations, and that resonable accuracy can be achieved in the determination of SO2 emissions from stack gases by fuel analyses and CO2 determinations.

44993 **APTIC NO. 65453**

Smith, Franklin, Denny E. Wagoner, and A. Carl Nelson, Jr.

GUIDELINES FOR DEVELOPMENT OF A QUALITY ASSURANCE PROGRAM: VOLUME I - DETERMINATION OF STACK GAS VELOCITY AND VOLUMETRIC FLOW RATE (TYPE-S PITOT TUBE). *Research Triangle Inst., Research Triangle Park, N. C., Environmental Protection Agency Contract 68-02-1234, Program Element 1HA327, Rept. EPA- 650/4-74-005-a, 76p., Feb. 1974. 17 refs.*

NTIS: PB 232437/AS

Guidelines for the quality assurance of average stack gas velocity and volumetric flow rate measurements by the Federal reference method are presented. They include: good operating practices; directions on how to assess performance and qualify data; directions on how to identify trouble and improve data quality; and directions to permit design of auditing activities. These guidelines are designed for use by operating personnel. The measuring process outlined includes pre-sampling preparation, on-site velocity measurement, and post-sampling operations. Calibration with a pitot tube is described. Directions are given for field team supervisor and manager of groups of field teams requirements. (Author abstract modified)

44994 **APTIC NO. 65574**

Spicer, Chester W. and David F. Miller

NITROGEN BALANCE IN SMOG CHAMBER STUDIES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 26p., 1974. 24 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-247.)*

The monitoring of all major nitrogen-containing compounds are reported. Nitric oxide and nitrogen dioxide have been monitored by chemiluminescence and automated Saltzman techniques. Methyl, ethyl, and peroxyacetyl nitrates have been determined by gas chromatography. Two methods, one continuous and one integrated, have been specially developed to measure nitric acid both in the smog chambers and in the atmosphere. Continuous determination of these compounds yields good nitrogen balances throughout the irradiations. Profiles of the nitrogen-containing species from irradiated hydrocarbon/NOx mixtures are discussed in terms of nitrogen products and nitrogen balance. Differences in product distribution for different hydrocarbon systems are also considered. Using rate information from the nitrogen-compound profiles, important reactions leading to nitrogen-containing products are identified.

44995 **APTIC NO. 68137**

Sudo, Kozo and Mitsu Sone

PERCEPTION TEST OF BAD ODOR. *(Akushu sokutei ni okeru kanno shiken no shuho ni tsuite). Text in Japanese. Miyagiken Kogai Gijutsu Center Hokoku (Miyagi Prefect. Pollut. Contr. Tech. Center Rep.), no. 2:32-36, April 1974.*

Four types pf perception test of bad odor are reviewed and results obtained are compared. By the steady excitation method, differently diluted samples having odor strengths from Rl to Rm were given to panellers n times, and the Rjth value which was judged perceptible with 50% probability was defined as the threshold value of odor strength. By the convenience method of steady excitation, yes and no reactions to odor of differently diluted samples were judged by panellers and threshold values of panellers were averaged and defined as the group threshold value. The correlation coefficient between values obtained by the two methods was 0.96. In the triangle test, three samples, of which two were the same in odor strength but one was differently diluted, were given to a paneller to find out which one was different. The dilution ratio of the sample which was pointed out correctly with 58% probability was defined as the odor strength. The results were treated by the binomial theorem to determine odor strength.

44996 **APTIC NO. 65153**

Sugano, Saburo and Shozo Fukui

AIR TEST METHODS. *(Kuki shikenho). Text in Japanese. Eisei Kagaku (J. Hyg. Chem.), 20(3):160-170, June 1974.*

Analytical methods for ammonia, hydrogen cyanide, nitrogen oxides, and organophosphorus compounds are described. Air containing ammonia was sampled at a rate of 1 to 2 l/min through an absorbing tube containing 50 ml of boric acid solution. The solution was diluted to 250 ml with the same boric acid solution to give a sample solution. An aliquot of sample solution was taken in a beaker and equal quantity of standard solution containing 1 ppm of NH3 was added. The solution was then subjected to an ionic electrode and analyzed. The NH3 concentration was obtained from a calibration curve. Air containing hydrogen cyanide was sampled the same way using sodium hydroxide solution as the absorbing agent. It was then analyzed by the ion-electrode method. Nitrogen oxides were sampled after passing through a filter surrounded by a heater. The analysis was carried out by a nitrate electrode. Air containing organophosphorus compounds was sampled at a rate of 1 to 2 l/min by an absorbing tube filled with 20 ml of hexane and cooled in ice water. The solution was then concentrated to 5 ml as sample solution. It was then analyzed by gas chromatography with a flame photometric detector.

44997 **APTIC NO. 68106**

Tamura, Hozumi, Hirohisa Shima, Yoshihisa Nagai, Masahito Kimoto, Yoshimasa Kaizu, Motohide Murata, Noriyoshi Ito, and Miwa Takatsuka

INVESTIGATION AND ANALYSIS OF AUTOMOTIVE EMISSION GAS DISPERSION ON THE FLAT GROUND. *(Heitanchi ni okeru jidosha haishutsu gasu no kakusan chosa to sono kaiseki). Text in Japanese. Mie-ken Kogai Senta Nenpo (Mie Prefect. Pub. Nuisance Center), no. 2:37-41, March 1974. 10 refs.*

An investigation of automotive exhaust gas dispersion was conducted for two days in early summer 1973 on a highway between Nagoya and Yokkaichi where the atmosphere was relatively free of industrial pollution and traffic was heavy. The fluctuation of concentrations of nitric oxide, nitrogen dioxide, and sulfur dioxide on the road and dispersion parameters were examined. The measurements of these pollutants, traffic amount, the wind direction, the wind velocity, and temperature were taken at eight locations and 13 samples were taken. The dispersion of automotive exhaust gases to the lee of the wind was studied by a dispersion model based on a regular dispersion model and parameters were hypothesized. The findings were roughly as follows: the concentration of nitrogen oxides reduces rapidly from the highway to 100 m in the lee, but there is not much difference between 100 and 200 m from the highway; the parameters obtained from the regular dispersion formula are greater than the Pasquill-Gifford parameters in the immediate vicinity of the highway, and thr reason may be the stirring of exhaust gas by running cars. The initial dispersion width is about 2.5 m. Using the parameters obtained, concentrations at various points were calculated, and they were in agreement with actual measurements.

44998 **APTIC NO. 68086**

Thompson, C. R., G. H. Farrah, L. V. Haff, W. S. Hillman, A. W. Hook, R. L. Saltzman, E. J. Schneider, J. D. Strauther, and L. H. Weinstein

SOURCE SAMPLING FOR FLUORIDE EMISSIONS FROM ALUMINUM, STEEL AND PHOSPHATE PRODUCTION PLANTS: A STATE-OF-THE-ART REPORT. *Health Lab. Sci., 11(4):354-359, Oct. 1974. 9 refs.*

The state-of-the-art of source sampling for gaseous and particulate fluoride emissions from aluminum and steel plants and phosphate production facilities is reviewed. Particulate collectors employed for separation of gaseous and particulate fluorides in dry emission streams from primary aluminum and steel plants include electrostatic precipitators and high- efficiency filters. Some of the particulate is generally collected on the walls of the sampling probe. Insufficient data exist for demonstrating the effectiveness of in-stack filters for reducing the amount of particulate in the probe. All sampling trains employ impingers to collect gaseous fluorides, and differences in collection efficiency using water versus dilute caustic appear negligible. There is no provision for conducting a separation of gaseous and water soluble particulate fluorides in the case of wet streams from phosphate rock processing operations. The apparatus generally used for sampling stack emission is the same as for the dry stream industries, except for elimination of the particulate collector. The tendency of hydrogen fluoride to react with particulate matter on filters can be minimized in some cases by converting the HF to silicon tetrafluoride with a heated glass probe. The SiF4 is then collected in the impingers, hydrolyzed with dilute alkali, and analyzed by an appropriate method.

44999 **APTIC NO. 64978**

Trost A.

CONTINUOUS DETERMINATION OF SULFUR AND DENSITY OF MINERAL OILS INDEPENDENT OF THEIR C/H-RATIO. *(C/H-unabhaengige kontinuierliche Schwefelbestimmung und Dichtemessung bei Mineraloelen). Text in German. Erdoel Kohle - Erdgas -Petrochem., 27(8):431-434, Aug. 1974. 1 ref.*

Continuous sulfur analyzers with density compensation using low energy gamma-radiation for sulfur determination and high energy gamma-radiation for the measurement of density have performed well in practical application. When analyzing different oils a carbon/hydrogen dependency of 0.01% S per %-change of the C/H ratio can be significant. This influence can be compensated for by a continous measurement of the H content by means of a neutron probe in such a way that an accuracy of + or - 0.01% S for sulfur and + or - 1 g/cu dm for density can be achieved independent of the C/H ratio.

45000 **APTIC NO. 68230**

Turman, Bobby N.

PARTICLE SAMPLING APPARATUS. *(Assignee not given.) U. S. Pat. 3,802,167. 6p., April 9, 1974. 9 refs. (Appl. June 29, 1973, 3 claims).*

A particle sampling apparatus which is adaptable for external mounting on an aircraft for in-flight use is described. Unlike prior art particle sampling devices, the apparatus permits sampling of different particle-entrained gaseous medium flows at different times and places, without requiring that the entire flow into the apparatus pass through and out of the filters. The sampler includes an open-ended flow tube having an inlet and outlet, deflecting vanes positioned at the tube inlet, several collection compartments disposed intermediate of the inlet and outlet, a conically-shaped deflector (i.e., a skimmer) within the flow tube and forward the collection compartments, a rotatable selection disk between the skimmer and the collection compartments, a remotely actuable motor to rotate the selection disk, and a drag-reducing aerodynamically shaped housing. Each collection compartment has an entrance to permit inflow of particle-entrained gas and an exit which is fitted with a removable filter. The skimmer diverts the flow of the particle-entrained gas toward and into the collection compartment, and a rotatable selection disk with a selectivity positional off-center aperture feeds the particle-entrained gas to the collection compartments. (Author abstract modified)

45001 **APTIC NO. 65156**

Yoneyama, Etsuo, Saburo Sugano, and Shozo Fukui

AIR POLLUTION TEST METHODS. *(Taiki osen shikenho). Text in Japanese. Eisei Kagaku (J. Hyg. Chem.), 20(3):171-172, June 1974.*

Vanadium exists in heavy oil as a chelate with mesoporphiline methyl ester, and the combustion ash of the oil may contain up to 80% of its oxides. Air is sampled in a standard way and to each 50 ml of the sample and blank solutions, add 5 ml of phosphoric acid and 2 ml of 10% ammonium sulfamate solution. After 10 min, the solution is titrated with potassium permanganate until it becomes purple. Two ml of hydrochloric acid and 10 ml of N-benzoylphenylhydroxylamine benzene solution are added and shaken for 30 sec. The benzene layer is washed with several portions of 2 ml HCl until no coloration of the HCl solution is visible. The benzene layer is transferred to a colorimetric tube and dried with granular calcium chloride. The absorbance is measured near 530 nm and the concentration is determined from a calibration curve previously prepared.

45002 **APTIC NO. 65713**

Zhang, Chijun

APPLICATION OF RING OVEN TECHNIQUES FOR AIR POLLUTION STUDIES. *(Huanlu jishu zaikonqi wuran yanchiu zhongde yingyong). Text in Chinese. Hua Hsueh Tung Pao (Chem. Bull.), 23(2:26-30, 1974. 32 refs.*

The glass ring oven technique is a micro-analysis method which uses suitable solvents to wash soluble ions in small quantity of air sample collected on a filter paper followed by heating in the ring oven. Samples are collected by introducing air through a membrane filter. The materials used as the filter membrane include filter papers for quantitative analysis, cellulose acetate, glass fiber, cotton, and nylon. Filter papers for sulfur dioxide analysis are usually pretreated with a drop of 10% potassium hydroxide or potassium carbonate follwoed by drying at 110 deg. The sample is then transferred to the ring oven by the following methods: the filter paper is placed directly on the ring oven and the sample is washed with a given quantity of reagent. If zinc is to be determined, the sample is wetted with 1 M hydrogen chloride and washed with a small quantity of distilled water into the ring oven; if the filter membrane is cellulose acetate, a drop of acetone is added, and the membrane is pressed on the ring oven and washed with a given quantity of solvent; a sample which is difficult to dissolve can be treated by immersing the membrane in a given amount of solvent, and part of which is then taken to the ring oven and determined. Other metals such as lead mercury, copper, and so on can also be measured with the ring oven technique.

45003 **APTIC NO. 65398**

(Inventor not given.)

QUANTITATIVE MEASUREMENT OF NITROGEN DIOXIDE IN GASEOUS MIXTURES. *(Ford Motor Co., Ltd., London (England)) Brit. Pat. 1,343,858. 5p., Jan. 16, 1974. (Appl. May 19, 1972, 13 claims).*

This invention relates to the quantitative measurement of the concentrations of nitrogen dioxide in gaseous mixtures, and other nitrogen compounds including nitric oxide, and ammonia. The process is based on the discovery that contacting the gaseous mixture with certain materials (copper, molybdenum) maintained at selected temperatures permits substantially complete conversion of nitrogen dioxide to nitric oxide without significant conversion of ammonia and without destryoing any significant amount of existing nitric oxide. Measuring the amount of nitric oxide in the resulting mixture by chemiluminescence and comparing the value with the amount of nitric oxide in the original mixture produces a measure of the amount of nitrogen dioxide.

45004 **APTIC NO. 65618**

Kanagawa Prefectural Industrial Experiment Station (Japan) and Kanagawa Prefectural Pollution Control Center (Japan)

RESEARCH REPORT: TESTS ON FLUE GAS DUST QUANTITATION METHODS. (SAMPLERS, MEASURING POINTS, AND MEASURING LOCATIONS). *(Endo haigasuchu no baijinryo sokutei hoho no jikkenteki kento (shiryo saishukan, sokuteiten, sokutei ichi ni tsuite)). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 16:128-135, Feb. 1974. 9 refs.*

When sampling flue gas for measurement of dust concentration, the selection of sampling point and the flow speed influence the measurements greatly. A test flue model with a 270 mm side right square cross section with a 16.5 m long straight horizontal and a 5 m straight vertical section after a 90 degree bend was used. This flue can create the maximum of 100 cu m/min air current. The flow quantity control and flow quantity monitoring was achieved by a butterfly valve adjustment and an orifice flow meter. A test powder of known size and quantity is supplied evenly by a magnetic feeder into the air current near the sampling orifice. The concentration is known from the air quantity and the powder supply. Utilizing this model, the measurement errors, measurement locations, and measuring points were examined, and the shape of the sampler tube, dust concentration, and average concentration were compared. The findings were as follows: the test tube must have a shape that would be little affected by the air current line by nozzle thickness and the large obstruction in the back. The dust collection part must be away from the sampling nozzle, and the tip of the nozzle should be probably sharper than 30 deg. Sampling from the horizontal part of the tube should be taken with a consideration for gravity. At the bend, the measuring position and the number of measuring points should be selected so that the gas flow speed distribution is even.

45005 **APTIC NO. 65623**

Kanagawa Prefectural Pollution Control Center (Japan) and Kanagawa Prefectural Assoc. for Pharmacists (Japan)

EVALUATION OF CYANIDE ANALYSIS IN AUTOMOTIVE EXHAUST GASES BY ION ELECTRODES. *(Ion denkyokuho ni yoru jidosha haishutsu gasuchu no shian no bunsekiho no kento). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 16:142-145, Feb. 1974. 1 ref.*

For analysis methods for cyanide in automotive exhaust gases, ion electrode and pyridine pyrazolone methods were tested and compared. The latter recovered only 50-70% of cyanide, but the electrode method recovered 95 to 100% of cyanide in the standard solution, and the method was simple and accurate. An outline of the method is as follows: exhaust gas is absorbed in 5 N sodium hydroxide (20-100) v ml, 40 ml of this absorbent is transferred to a test tube, and pH is adjusted to 12.7 to 13 by adding (15-100) 5N sulfuric acid. Then 10 ml of lead acetate and sodium hydroxide solution is added and stirred for more than 5 min. Then 0.1 N sodium hydroxide is added to make the total quantity 250 ml. This is the test solution. Absorbent 100 ml is taken into a tube and given the same treatment as above is for the blank test. Various concentrations (0.1, 1, and 10 ppm) of cyanide ion standard solution are taken into three test tubes, and electrodes (cyanide ion electrode and comparative electrode) are placed in the solutions and stirred for 5 min. The potentials are noted. In this case the potential difference between 1 ppm and 10 ppm solutions should be more than 50 m V. Cyanide concentration is noted on a logarithmic graph paper, and the standard solution concentration and potential relationships are plotted. The calibration line is determined by the line going through three points. The test solution, the blank test solution, the standard solution, and their potentials in reference to the calibration line will show the concentration of the test solution.

45006 **APTIC NO. 68113**

Japan Instrumentation Control Assoc., Pollution Measurement Equipment and Standard Research Committee

AIR POLLUTION MEASUREMENT EQUIPMENT. *(Taiki osen keisokukiki). Text in Japanese. Keiryo Kanri Keisoku Keiso (J. Instrum. Control Assoc., Japan), 23(9):415-417, Sept. 1974.*

Standards are discussed for automatic, continuous air pollution measurement equipment. Measurement equipment should be placed in suitable locations free of undesirable environmental influences which lead to erroneous sampling and readings. Standard samples of gas and particulate matter for calibrating the equipment are necessary. Secondary standards must be carefully scrutinized. Safety precautions in the operation of the equipment with high pressure gases were outlined in a manual issued by the Japan Environmental Bureau in October 1973. Different measurement methods, suitable for measuring different kinds of gas and dust concentrations, are tabulated.

There are devices to measure pollution at its source, and in the atmosphere and environment. Measurement equipment is scheduled for yearly overhaul. A suggested form for recording pollution measurements is included.

1973

45007 **APTIC NO. 65732**

Badayev, V. V., Y. S. Lyubovtseva, and L. S. Turovtseva

DETERMINATION OF AEROSOL MICROSTRUCTURE FROM AUREOLAR MEASUREMENTS BY V. F. TURCHIN S METHOD. *Bull Acad. Sci. (USSR), Phys. Atmos. Oceans. (English translation from Russian of: Izv. Akad Nauk SSSR, Fiz. Atmosfery i Okeana), 9(10):592-596, Oct. 1973. 15 refs.*

Aerosol microstructure was determined from aureolar measurements by V. F. Turchin s method. Statistical regularization of solutions of inverse problems in a statistical ensemble of smooth functions was applied to the aerosol particle spectrum in ground fogs. Measurements made in the aureolar part of the monochromatic scattering envelope were used. The method was tested on mathematical models. Information of the transformation processes of the dispersed phase was obtained. The variations of the particle size spectrum in the processes of formation and transformation of fogs and clouds was followed. (Author abstract modified)

45008 **APTIC NO. 65450**

Bennewitz, Paul F.

DEVELOPMENT OF A SUPPLEMENTARY EMISSION MEASUREMENTS MONITORING SYSTEM. *Thunder Scientific Corp., Albuquerque, N. Mex., Environmental Protection Agency Contract 68-02-0588, Program Element 1A1010, Rept. EPA-650/2-73-008, 41p., Oct. 1973. 8 refs.*

NTIS: PB 232442/AS

A prototype Supplementary Emission Measurements System is described in its use for providing measurement of carbon dioxide, carbon monoxide, water, and oxygen in stack gases of stationary emission sources. Sensors were developed or obtained from other sources to meet the criteria set forth in the requirement. The system was designed to facilitate direct readout of all channels via individual analog metering. In addition, outputs of 0 to 1 VDC were provided for online computer feed. The system was equipped with a stack sampling probe, filters, and pump to provide full and complete stack sampling and measurement capability. Viable and useful solid state semiconductor sensors can be constructed and tuned to accurately and selectively measure CO_2, CO, and H_2O percentage ranges within a closed gas sampling system. (Author summary)

45009 **APTIC NO. 65350**

Chapman, R. L.

CONTINUOUS STACK MONITORING TECHNIQUES: SAMPLING AND STANDARDIZATION. *Beckman Instruments Process S.A., Geneva (Switzerland), Proc. Int. Symp. Environ. Meas., Geneva, Switzerland, 1973, p. 143-163. 14 refs. (Oct. 2-4.)*

The application of automatic instrumental monitoring systems to stationary sources has been feasible for many years, but, due to the cost and the lack of any incentive, industry has ignored them. Recent Environmental Protection Agency activity has stirred interest in such systems, which in turn has spurred the development of new instrumental methods. Attempts are being made to provide methods for testing instrument performance and for expressing it in standard format. Various aspects of sampling and standardization in continuous stack monitoring are discussed, including: emission sources, monitoring requirements, monitoring instrumentation, extractive versus in-situ monitoring, instrumental operating principles (photometric opacity meter; in-situ nitric oxide and sulfur dioxide monitors for power plant stacks; extractive spectroscopic instruments for SO_2, NO, nitrogen dioxide, and carbon monoxide; flame photometric method for SO_2; chemiluminescent analyzer for nitrogen oxides; polarographic analyzer for sulfur oxides and nitrogen oxides; polarographic analyzer for oxygen; and process chromatograph for hydrogen sulfide in refinery gases), interface requirements for stack monitors, sample conditioning hardware, sample interface systems, new developments in sample interface systems, and monitor system performance standardization.

45010 **APTIC NO. 65368**

Drayson, S. R., F. L. Bartman, W. R. Kuhn, and R. Tallamraju

FEASIBILITY OF SATELLITE MEASUREMENT OF STRATOSPHERIC MINOR CONSTITUENTS BY SOLAR OCCULTATION (TECHNICAL REPORT). *Michigan Univ., High Altitude Engineering Lab., National Oceanic and Atmospheric Administration Contract Grant NG-10-72, ORA Proj. 011023. 01123-2-T, 42p., Oct. 1973. 52 refs.*

The determination of stratospheric concentration of minor constituents by satellite solar occultation is examined. The method is feasible for ozone up to 50 km, water vapor up to 50 km, nitrous oxide up to 30 km, methane up to 50 km, and carbon monoxide up to 20 km. Transmittance calculations for these and other gases are presented for optimal spectral regions. Calculations of extinction by aerosols in the lower stratosphere show a dominant effects in the window regions near 10 micron. Several inversion techniques are developed, and examples of profiles retrieved by different methods are compared. Computer programs are described to calculate the transmittances by the use of a band model and by the line-by-line integration technique. (Author abstract modified)

45011 **APTIC NO. 65150**

Eguchi, Tadashi

MEASUREMNT OF NOX BY CHEMILUMINESCENCE. *(Kagaku hakko-ho ni yoru NOx no sokutei). Text in Japanese. Preprint, Japan Society for Spectroscopy, Tokyo, p. 1-5, 1973. 15 refs. (Presented at the Japan Society for Spectroscopy, Fall Meeting, Dec. 9-11, 1973.)*

The chemiluminescence method for nitrogen oxides by measuring the intensity of light emitted by a substance in the transition from the excited state to ground state is described with a kinetic explanation of the reaction mechanism. In the dilute concentration of reactants, the light intensity is directly proportional to the concentration. The NOx concentration meter, based on nitric oxide-ozone chemiluminescence, is described with a flow diagram. The sample gas and oxygen-containing O_3 is injected into a reactor at a given rate through a thermal dissociation reduction device for converting NO_2 to NO after the removal of dust and moisture. The measurements are made in the range of 600-875 nm by the use of photoelectron multiplier and photoelectric filter in order to eliminate the interference of the coexisting gases. The inner pressure of the reactor tube is reduced to provide free space for molecular movement to minimize the collision of the excited molecules with other molecules. The sensitivity varies with the flow rates of sample gas and O_3, the inner pressure of reactor, and particularly the dark current of the photoelectron multiplier. The reliable concentration range for measurement is 0.01-1 ppm at room temperature. The linearity of the output power to the concentration is excellent over a wide range. The interference of coexisting iron, nickel, carbonyl compounds, olefins, and sulfides are also discussed.

45012 **APTIC NO. 64974**

Hashizume, Genzo

FLUORESCENT X-RAY ANALYSIS OF DUSTS. *(Funjin no keilo X-sen bunseki). Text in Japanese. Preprint, Japan Society for Spectroscopy, Tokyo, p. 22, 1973. 23 refs. (Presented at the Japan Society for Spectroscopy Fall Meeting, Dec. 9-11, 1973.)*

The classification of instrumental analysis methods for atmospheric pollutants is given. The X-ray analysis includes fluorescent X-ray spectrometry, X-ray diffraction, electron probe microanalysis, and X-ray photoelectron spectrometry. The toxic elements such as zinc, lead, cadmium, copper, and vanadium contained in dust collected by high-vol air samplers can be determined with a high sensitivity, ease, and simplicity of procedures. The results of Pb determination by fluorescent X-ray spectrometry and atomic absorption spectrophotometry are in good agreement. The comparison of Pb and Zn analysis, collected by an electrostatic precipitator and measured by the fluorescent X-ray and atomic absorption methods, indicates that the results are also in good agreement. The sensitivity level is 0.5 microgram/g for Zn and 5 micrograms/g for Pb. The method of using radio isotopes as excitation source and a semi-conductor as a detector is described with flow diagrams of the device. The X-ray microanalysis using a recently developed electron probe microanalyzer provides much information.

45013 **APTIC NO. 65050**

Hochrainer, D.

THE MEASUREMENT OF AEROSOL PARTICLE SIZE DISTRIBUTION WITH AN IMPROVED SPECTRAL IMPACTOR. *(Zur Messung der Groessenverteilung des Feinstaubes mit einem verbesserten Spektralimpaktor). Inst. fuer Aerobiologie (West Germany), 1973. 6 refs. Translated from German, 18p.*

A newly designed impactor is described which deposits aerosol particles of aerodynamic diameters between 0.5 and 5.0 micron according to their size on a single stage. Concentric flows of clean air and aerosol are joined, accelerated, and aerodynamically focused in a round nozzle. The particles are deposited on a slide, the larger particles closer to the center than the smaller ones. The calculated calibration from a flow-field model is in qualitative agreement with the empirical calibration. Particle size measurements of aerosols in coal mines and their size distributions are reported. Test results of calibration of the impactor with latex particles are also described.

45014 **APTIC NO. 65494**

Husar, R. B.

RECENT DEVELOPMENTS IN IN SITU SIZE SPECTRUM MEASUREMENT OF SUBMICRON AEROSOLS. *Environmental Protection Agency, Washington, D. C.; National Center for Atmospheric Research, Boulder, Colo.; and American Society for Testing and Materials, Philadelphia, Pa., Committee D-22 on Methods of Sampling and Analysis of Atmospheres, Instrum. Monit. Air Qual., Proc. Symp., Boulder, Colo., 1973, ASTM TR 555, p. 157-192. 32 refs. (Aug. 14-16.)*

Recent developments for in situ atmospheric aerosol size spectrometry in the diameter range below a few micron are reported. Such particles are responsible for most visibility reduction and are most dangerous to human health. The use of optical single particle counters for aerosol size spectrometry is reviewed, and the main factors in counter design and aerosol characteristics affecting their performance are discussed. The main characteristics of a modified Climet Instruments, Inc. counter, intended primarily for high range resolution atmospheric measurement in the 0.25 to 3.0 micron range are reported. Its main feature is an ellipsoid mirror scattered light collector. The design, operation, calibration, and size resolution of the University of Minnesota s Electrical Aerosol Analyzer is discussed. The instrument is capable of measuring aerosol size spectra in situ in the diameter range from about 0.004 to 0.5 with its size resolution being best at about 0.01 micron. A simple device, the diffusion battery, can be used for rough size distribution measurement in the range 0.0002 to 0.1 micron. Its principles of operation, design, and use are discussed. (Author abstract)

45015 **APTIC NO. 65493**

Lee, R. E.

MEASURING PARTICULATE MATTER IN AIR. *Environmental Protection Agency, Washington, D. C.; National Center for Atmospheric Research, Boulder, Colo.; and American Society for Testing and Materials, Philadelphia, Pa., Committee D-22 on Methods of Sampling and Analysis of Atmospheres, Instrum. Monit. Air Qual., Proc. Symp., Boulder, Colo., 1973, ASTM TR 555, p. 143-156. 23 refs. (Aug. 14-16.)*

Results obtained from measurements of the concentration and size of particulate matter in air are dependent on the method used. Filtration samplers in conjunction with gravimetric analysis, as exemplified by the high-volume air sampler, represent the most commonly used technique in this country. The spot tape sampler and smokeshade devices have value in assessing the soiling properties of particulate matter, but are poor indicators of mass loading. Continuous monitors now available for measuring the concentrations of atmospheric particulate matter appear promising, although further field testing is needed to assess their accuracy. Devices are available for determining the size distribution of particles by number or by weight. Care should be taken not to interchange the results of a number and a weight distribution since they are not equivalent nor necessarily directly relatable. Cascade impactors are preferred for determining the weight size distribution because the fractionated sample is retained for chemical analysis and the respiratory portion can be assessed. (Author abstract)

45016 **APTIC NO. 65357**

Lorenz, Gerhard

AEROSOL PARTICLE SIZE DISTRIBUTION DETECTOR. *(Vorrichtung zum Bestimmen der Teilchengroessen-Verteilung von Aerosolen). Text in German. (Sartorius-Membranfilter GmbH, Goettingen (Germany)) W. Ger. Pat. Appl. 2,213,859. 4p., Oct. 4, 1973. 1 ref. (6 claims).*

A tube detector employs atomic absorption and has a device for feeding the aerosol particles to a flame where they are vaporized, and a photocell which is sensitive to one or more frequencies in the particle atom emission spectrum. A light source emits a beam which is converted to a parallel beam by a diverging lens after passing through the flame and is then directed onto a photomultiplier through a monochromator. The beam has the same spectral composition as the particle atom emission spectrum.

45017 **APTIC NO. 65151**

Musha, Soichiro and Taketoshi Nakahara

ATOMIC ABSORPTION SPECTROPHOTOMETRY OF MERCURY. *(Suigin no genshi kyuko bunseki). Text in Japanese. Preprint, Japan Society for Spectroscopy, Tokyo, p. 6-16, 1973. 47 refs. (Presented at the Japan Society for Spectroscopy, Fall Meeting, Dec. 9-11, 1973.)*

The chemistry, physical and chemical properties, atomic structure, and nuclear isomers of mercury are reviewed from the aspect of atomic absorption. The toxicity of Hg as environmental pollutant and the physiological effect of Hg on animals and humans are described. Various methods used for the determination of microscopic amounts of Hg by atomic absorption are reviewed. In the chemical flame method, low-temperature flames such as air-coal gas and air-acetylene and reducing agents such as ascorbic acid and stannous chloride are most suitable. The sensitivity is greatly increased by the addition of a chelating agent such as EDTA. The sensitivity ranges reported are 0.02 ppm for Hg(I) and 0.05 ppm for Hg(II). In the non-flame method, the Hg collected on copper, silver, or gold wire as an amalgam is vaporized by heating, and the atomic absorption of Hg vapor is measured. The sensitivity is about 10,000 times higher than that of the flame method, and measurement for 1 ppb levels is possible. In the Hg reduction method, the sensitivity is at the 0.1 ppb level. In the indirect method for Hg determination, the sensitivity is 0.025 ppm for organic Hg and 0.05 ppm for inorganic Hg. The atomic fluorimetry is also classified into the flame and non-flame methods. The sensitivity level is 0.002 ppm for oxygen-hydrogen flame, 0.08 ppm for air-H2 flame, 0.07 ppm for nitrogen separated air- C2H2 flame and 0.6 ppm for air-propane flame. Non-flame methods have a sensitivity level of 7 pg for the carbon rod atomizer method and 600 pg for the reduction vaporization method.

45018 **APTIC NO. 65341**

Nader, John S.

STATUS OF SOURCE MEASUREMENT TECHNIQUES IN THE UNITED STATES. *Beckman Instruments Process S.A., Geneva (Switzerland), Proc. Int. Symp. Environ. Meas., Geneva, Switzerland, 1973, p. 63-76. 11 refs. (Oct. 2-4.)*

The purpose of measurement data should be considered in the selection of source measurement methods. In the U. S., stack emissions must be monitored in support of three specific types of regulations: new source performance standards, national emission standards for hazardous air pollutant substances, and state implementation plans. The measurements prescribed by these regulations and the measurement techniques employed are discussed. New and developmental techniques that may be employed for such measurements are also discussed.

45019 **APTIC NO. 65491**

Purdue, L. J.

PERFORMANCE EVALUATION OF SO2 MONITORING INSTRUMENTS. *Environmental Protection Agency, Washington, D. C.; National Center for Atmospheric Research, Boulder, Colo.; and American Society for Testing and Materials, Philadelphia, Pa., Committee D-22 on Methods of Sampling and Analysis of Atmospheres, Instrum. Monit. Air Qual., Proc. Symp., Boulder, Colo., 1973, ASTM Tr 555, p. 3-8. 6 refs. (Aug. 14-16.)*

Continuous air monitoring sulfur dioxide instruments which employ the four measuring principles most commonly used by federal, state, and local air pollution agencies are discussed. These measuring principles are colorimetry, conductivity, coulometry, and flame photometry. The advantages and disadvantages of using analyzers which employ each of these principles for collecting air quality data are discussed. Definitions for performance parameters and suggested performance specifications for SO2 analyzers are given. (Author abstract)

45020 **APTIC NO. 65683**

Rokosz, Andrzej and Andrzej Grajpel

SPECTROGRAPHIC INHOMOGENEITY CONTROL OF LABORATORY SAMPLES OF INDUSTRIAL DUSTS. *(Spectrograficzna kontrola niejednorodnosci laboratoryjnych probek pylow przemyslowych). Text in Polish. Chem. Anal. (Warsaw), 18(3):593-598, March 1973. 2 refs.*

A method of spectrographic inhomogeneity control of laboratory samples of the blast furnace dusts is presented. A laboratory dust sample with a 200 to 250 g mass in a tight glass jar with a capacity of 1.5 l was mixed for 1 hr by means of a rotating mixer. Afterwards it was spread on paper, creating a circular stratum with a 20 cm diameter and a 0.5 cm thickness. Ten analytical samples were taken from various places symmetrically disposed at a distance of 3 cm from the margin of the stratum as well as from the middle of the circle. The samples were ground in an agate mortar, adding a couple of ethyl alcohol drops. After drying the analytical samples at 110 to 115 C up to a solid mass, from each of them, two 50.00 mg weights were made. The latter were melted according to Grajpel s method with the addition of cobalt oxide, and were ground again. As the inhomogeneity measure, the scatter of the relative intensities of the spectral lines of elements present in the dusts was assumed. Various components were not equally uniformly distributed within laboratory samples. In order to increase the precision of determinations of elements which are distributed with poor uniformity, such as silicon, aluminum, magnesium, manganese, chromium, and copper, it was necessary to analyze an appropriately large number of analytical samples taken from various places of a laboratory sample.

45021 **APTIC NO. 65152**

Saito, Takeshi

DISTANT MEASUREMENT OF AIR POLLUTANT BY SPECTROSCOPY. *(Sokan bunkokei ni yoru taiki osen busshitsu no enkaku sokutei). Text in Japanese. Preprint, Japan Society for Spectroscopy, Tokyo, p. 34-38, 1973. (Presented at the Japan Society for Spectroscopy, Spring Meeting, May 24-25, 1973.)*

The distant measurement method for nitrogen dioxide and sulfur dioxide by correlation spectrometry is described with the principle of correlation spectrometry and theoretical equations. In the JASCO-BARRINGER correlation spectrometer, the concentration of NO2 and SO2 between the arbitrary light source and the sensor is determined by measuring the absorption at 4000-4500 A for NO2 and 3000-3100 A for SO2. The structure of the COSPEC model is illustrated with diagrams. The COSPEC model is compact and portable, and can be used for measurements at a fixed location or on an automobile, helicopter, or airplane. An artificial light source is suitable for measurement in limited areas such as tunnels or roadsides and at night. In this case, the average concentration can be obtained, since the distance between the light source and sensor can be easily measured. For vertical monitoring, the total atmospheric concentration in the telescopic range is measured using solar scattering light as a light source, and the data obtained can be used for making pollution maps. It can be applied also to the mass flow and diffusion measurement by vertical and horizontal traverse measurement.

45022 **APTIC NO. 65154**

Sakai, Kaoru and Katsumi Takami

MEASUREMENTS OF EXHAUST GASES BY CORRELATION SPECTROSCOPY, TWO-WAVELENGTH SPECTROMETRY AND FLAME PHOTOMETRIC DETECTOR. *(Sokan bunkoho, nihacho sokkoho oyobi enko koden kenshutsuho ni yoru haigasu no keisoku). Text in Japanese. Preprint, Japan Society for Spectroscopy, Tokyo, p. 39-43, 1973. (Presented at the Japan Society for Spectroscopy Spring Meeting, May 24-25, 1973.)*

The simultaneous measurement of nitric oxide, nitrogen dioxide, and sulfur dioxide by correlation spectroscopy, nitrogen oxides (NO + NO2 and sometimes nitrogen pentoxide) by non-dispersive ultraviolet spectroscopy, and SO2 by flame photometric detection are described. In correlation spectroscopy, two correlation marks corresponding strictly to the absorption peaks at 195-230 nm for NO, 420-450 nm for NO2, and 250-310 nm for SO2, and valleys of the absorption curve are used. The structure of the correlation spectrometer is illustrated with a flow diagram. In measurement of NO, interference by SO2 and NO2 can be corrected by adding or subtracting electrical output power corresponding to the negative or positive interferences. The measurement result showed a good correlation with results by manual analysis. In the two-wavelength spectroscopy, NOx are all converted to NO2 by reaction with ozone which produces N2O5 and decomposes to NO2 at about 300 C. A non-dispersive ultraviolet spectrometer is described. The absorption of NO2 at 405 nm is measured. The result showed a good correlation with results by manual analysis. In the flame photometric detection method, the characteristic emission of sulfur compounds in hydrogen flame is selectively measured at 394 nm. The intensity of emission spectrum is proportional to the approximate square of the concentration of S compounds. The coexisting S compounds are removed prior to the measurement by such means as gas chromatography. A fairly good linearity was found in the SO2 calibration curve.

45023 **APTIC NO. 65490**

Skogerboe, R. K.

MONITORING TRACE METAL PARTICULATES: AN EVALUATION OF THE SAMPLING AND ANALYSIS PROBLEMS. *Environmental Protection Agency, Washington, D. C.; National Center for Atmospheric Research, Boulder, Colo.; and American Society for Testing and Materials, Philadelphia, Pa., Committee D-22 on Methods of Sampling and Analysis of Atmospheres, Instrum. Monit. Air Qual., Proc. Symp., Boulder, Colo., 1973, ASTM TR 555, p. 125-136. 24 refs. (Aug. 14-16.)*

A critique of current methods of monitoring trace metal particulates is presented in which sources of error in both the sample collection and analysis processes are pointed out. The collection efficiencies are subject to question requiring that further research be carried out to define the extent of the problem. Membrane filters are inefficient for collection of particulates in certain size ranges. The definition of that fraction of atmospheric lead which passes a 0.45 micron filter is highly questionable. Procedures for the preparation of air filter samples for analysis are not as straightforward as desired and are subject to some problems dependent on the methods used. The two primary means for determining metals in atmospheric particulates can produce reliable results if appropriately used; otherwise, the results may be in serious error. Recommendations for the elimination of the problems are presented.

45024 **APTIC NO. 65492**

Smith, W. J. and A. L. Benson

FILTER MEDIA FOR ATMOSPHERIC SAMPLING. *Environmental Protection Agency, Washington, D. C.; National Center for Atmospheric Research, Boulder, Colo.; and American Society for Testing and Materials, Philadelphia, Pa., Committee D-22 on Methods of Sampling and Analysis of Atmospheres, Instrum. Monit. Air Qual., Proc. Symp., Boulder, Colo., 1973, ASTM TR 555, p. 137- 142. 6 refs. (Aug. 14-16.)*

Filter media now available for use in the analysis of atmospheres were not designed for such purposes and have some serious deficiencies. Properties of typical filters are stated. Cellulose paper filters have generally low and variable collection efficiency for small particles, high flow resistance, and sensitivity to moisture, making them almost impossible to work with for gravimetric measurements. The high efficiency mineral fiber type is made with commercial grades of glass fiber. When adapted to sensitive analytical work, such as trace metal determination, a serious contamination problem is immediately present. Chemically resistant glass can not be used in fine filters. Membrane filters can contaminate an analysis for collected particulates. The mechanisms by which particles are caught include sieving, impaction, and diffusion. Some directions are indicated toward possible improvement.

45025 **APTIC NO. 65298**

Stateczna, Maria

PROBLEMS CONNECTED WITH SAMPLING OF GAS. *(O problemach zwiazanych z pobieraniem probek gazu). Text in Polish. Chem. Anal. (Warsaw), 18(3):483-494, 1973. . 11 refs.*

Gas sampling problems are reviewed. Problems are caused by the instability of gas compounds, corrosiveness of gas, variability of temperature and pressure, the multitude of processes and sampling vessels used, velocity during sampling, chemical reactions during samplings, lack of standard gases, lack of sampling materials and installations, and lack of vessels for sampling gases under pressure. Present Polish standards do not indicate sampling methods in a complete way. The standards provide definitions of sampling methods depending on gas pressure and temperature, depth of test tube immersion in the gas duct, materials, cooling of hot gases, sampling of condensates, reduction of high pressures, and control of flow velocity during continuous sampling. British and American standards are also discussed. Sampling apparatuses, gas sampling, and sampling methods for specific cases are mentioned.

45026 **APTIC NO. 65601**

Strojek, Jerzy, Zbigniew Uziel, and Jerzy Zak

ANALYZERS FOR DETERMINATION OF SO2 IN GASES. *(Analizatory do oznaczania SO2 w gazach). Text in Polish. Chem. Anal. (Warsaw), 18(3):495-512, 1973. 41 refs.*

A review of the measuring and construction methods of semiautomatic and automatic sulfur dioxide analyzers, elaborated during the last 20 years, is presented. A classification of the analyzers according to the physicochemical methods used for measuring is provided. The measuring methods are: electrochemical, electrolitic conductive, optical, thermoconductivity, thermic reaction heat, and measurement of radiation intensity. The analyzers are based on: potentiometry, electroconductometry, coulometry, polarography, spectrophotometry, colorimetry, thermoconductometry, thermochemisty, and radiometry. The principles of operations are given, and the given analyzers are described in detail. The operating ranges and application possibilities are discussed.

45027 **APTIC NO. 64965**

Sugimae, Akiyoshi

EMISSION SPECTROSCOPY ANALYSIS OF DUSTS. *(Funjin no hakko bunko bunseki). Text in Japanese. Preprint, Japan Society for Spectroscopy, Tokyo, p. 17, 1973. 17 refs. (Presented at the Japan Society for Spectroscopy Fall Meeting, Dec. 9-11, 1973.)*

Measurement methods for atmospheric suspended particulate concentration (particle size less than 10 micron) collected on various filters by emission spectroscopy are reviewed. Most commonly used glass fiber filters with 99.9% collecting efficiency for 0.3 micron particles contain a large amount of zinc, which makes them unsuitable for the determination of Zn. However, a large amount of arsenic is contained in others, so the filter has to be selected according to the type of metal element being determined. Recently, membrane filters are used more widely due to their low content of metallic element impurities. The particulates collected on glass fiber filter is heated at 500 C for the removal of organic matters, and acid extracted with nitric acid. The concentrated extract is placed in a center post type graphite electrode filled with buffer agent, and the concentrations of iron, lead, Zn, copper, manganese, tin, nickel, vanadium, titanium, molybdenum, antimony, cobalt, chromium, cadmium, and bismuth can be measured using the DC arc. Other procedures for glass fiber filter are also discussed. The membrane filters made of nitrocellulose, acetylcellulose, poly(vinyl chloride) and polypropylene are explosively combusted upon heating. Therefore, the membrane filter is generally carbonized with concentrated sulfuric acid and treated with HNO3-perchloric acid. The filter paper is no longer used very widely because of its low particle collecting efficiency and low gas permeability. The uses of polystyrene filters and activated charcoal filters are discussed.

45028 **APTIC NO. 68066**

Suzuki, Shin and Nobutoshi Horiuchi

RESTUDY OF ANALYSIS OF NITROGEN OXIDES BY MEANS OF SALTZMAN REAGENT METHOD. *(Zarutsuman-ho ni yoru chisso sankabutsu bunseki-ho no saikento). Text in Japanese. Chiba Daigaku Kankyo Kagaku Kenkyu Hokoku (Environ. Sci. Res. Rep. Chiba Univ.), 1(1):93-98, July 1973.*

The Saltzman reagent method is generally utilized as a method of measuring nitrogen oxides. Since this method leaves various problematical points unsolved, a reinvestigation was made of the following items: the absorption spectrum of Saltzman s absorption solution; the effect of flow velocity; the oxidation rate of oxidation reagents converting nitric oxide to nitrogen dioxide; the effect of the concentration of oxidation solution;

the effect of oxidation solution in terms of its temperature; and interference by ozone. The NO2 absorption rate of Saltzman solution is remarkably influenced by flow velocity and the amount of absorption solution and conversion of NO to NO2 means of oxidation is influenced by not only the abovementioned two factors but also the type, concentration, amount, and temperature of absorption solution.

45029 **APTIC NO. 65682**

Tomczyk, Danuta and Jadwiga Bajerska

SPECTROPHOTOMETRIC DETERMINATION OF DIMETHYLSULPHATE IN AIR. *(Spektrofotometryczne oznaczanie niewielkich ilosci siarczanu dwumetylowego w powietrzu). Text in Polish. Chem. Anal. (Warsaw), 18(3):543-549, 1973. 11 refs.*

The spectrophotometric determination of dimethyl sulfate vapors in air is described. Dimethyl sulfate with 1.328 weight was used. The basic solution of dimethyl sulfate was prepared by weighing several drops with an accuracy of + or - 0.0002 g in a measuring vessel with a 25 ml capacity containing 10 ml pyridine. It was filled to capacity with pyridine. From this basic solution, a sample working solution was prepared by dilution in another measuring vessel with a 100 ml capacity to a 0.0100 g/100 ml density of the dimethyl sulfate. When anhydrous pyridine was applied for absorption of dimethyl sulfate, N methylpyridinium methylsulfate formed according to the Fujiwara reaction which decomposed when heated with sodium hydroxide giving glutaconic aldehyde. With aniline latter formed a colored glutaconic aldehyde dianil. The limit of sensitivity of analysis is 0.15 micrograms of dimethyl sulfate/cu cm of air, when 50 cu dm of air is used, which is far less than the admissible amount (equal to 1 microgram of dimethyl sulfate/l cu cm). Halogen compounds, like aliphatic halogen hydrocarbons, interfere with determination of dimethyl sulfate because they form quaternary compounds with pyridine. To perform the analysis, 20 cu cm of air is passed at the rate of about 0.5 cu cm/min through two washers joined in series, each containing 3 cu cm of pyridine. When the absorption is finished, 1 cu cm of solution is taken from each washer to a beaker of 25 cu cm capacity, 0.5 cu cum of 0.2 N NaOH is added and heated on a boiling water bath for 15 min. After cooling, 1.0 cu cm of glacial acetic acid and 0.1 cu cm of aniline distilled from zinc dust are added. The beaker is covered and left standing for 30 min, and its contents are transferred to a measuring flask of 25 cu cm capacity (10 cu cm). The contents are stirred, and the absorbance is measured in 1 cm vessels at lambda equals 448 nm. The content of dimethyl sulfate is read from standard curves made for standard solutions in pyridine for ranges from 5.0 to 65 micrograms of dimethyl sulfate/25 cu cm or 2.5 to 22.5 micrograms/10 cu cm. The dependence of absorbance on concentration is linear. The error of this method established for standard solutions of dimethyl sulfate does not exceed 5%.

45030 **APTIC NO. 68067**

Yamane, Yasuhiro and Motoichi Miyazaki

A STUDY OF RADIATION SPECTRAL ANALYSIS OF MINUTE ELEMENTS IN SUSPENDED DUST. *(Taiki fuyu funjin-chu no biryo genso no hakko bunko bunseki-ho no kenkyu). Text in Japanese. Chiba Daigaku Kankyo Kagaku Kenkyu Hokoku (Environ. Sci. Res. Rep. Chiba Univ.), 1(1):73-78, July 1973. 5 refs.*

Suspended dust was collected by a low volume air sampler at the rate of 20 l/min for 2 week to study regional and seasonal fluctuations of suspended dust. A millipore membrane filter was used as filter medium. Since this sampling filter paper could be reduced to powder by a mixer, radiation spectral analysis was adopted with satisfactory results. A ratio of graphite powder to sodium chloride of 1 to 3.5 was excellent as spectral buffer. This is due to a spectral ray-intensifying effect by sodium and inhibition of fractional distillation by chloride. Since this method saves operations such as ashing at a high temperature and extraction with acid which are required in conventional radiation spectral analysis, it is free from errors stemming from ashing loss or incomplete extraction with acid.

1972

45031 **APTIC NO. 65440**

Coenen, Wilfried

DUST CLASSIFIER. *(Vorrichtung zum Sammeln von in einem Gas enthaltenen Staub fuer Analysezwecke). Text in German. (Hauptverband der gewerblichen Berufsgenossenschaften e.V., Berlin (Germany)) W. Ger. Pat. Appl. 2,046,453. 2p., March 23, 1972. 3 refs. (1 claim).*

Dust contained in air is collected for analysis by a flat filter in a housing, covering the whole cross section. An inflow nozzle opens into the housing and is directed toward the filter. An outlet duct from the housing is on the side of the filter opposite to the inlet. The filter has a surface which causes reflection of the particles when they impinge, in a region determined by the projection of the inlet nozzle s cross section in the direction of its axis.

45032 **APTIC NO. 65697**

Kazama, Masakatsu

STUDY ON DUST MEASUREMENT BY LIGHT SCATTERING METHOD IN THERMAL POWER PLANT. *(Hikari sanranho ni yoru karyoku hatsudensho baijin sokuteiho no kenkyu). Text in Japanese. Tohoku Denryoku Kabushikikaisha Kenkyu Kiho (Semiannu Rept. Tohoku Electr. Power Co., Inc.), no. 37:46-56, Oct. 1972. 4 refs.*

The dust measurement method (JIS-8808) specified under the Air Pollution Control Law and others for measurement of dust in stack gas of a thermal power plant lacks measuring ease and speed. The light scattering method was reviewed in detail in a specially designed stack model to determine if it could provide better measurement of the stack gas dust. The principles of the light scattering method and the light scattering type densitometers presently available are first discussed. The basic construction of the model stack used in this experimental study is also described. The sample dust used was fly ash produced in a thermal power plant. Seven samples of the fly ash were used, of which three samples of electrostatically precipitated ash were taken from A hopper and another three from B hopper. The seventh or last sample was mechanically collected ash. The results indicate that there is a linear proportional relation between the scattered light intensity and the dust concentration while the correlation coefficient between the two is 0.995 in case of the ash samples from the A hopper and 0.997 in case of those from the B hopper, both being high enough to indicate the possibility of calculating quantity of the dust from the scattered light intensity. Other related matters that could affect this approach were also investigated to find that the area factor of dust particle greatly affects the light scattering. The light scattering method may be able to offer a speedier dust measurement provided that a calibration curve based on the same sampling spots is prepared.

45033 **APTIC NO. 65383**

King, T. F., G. W. Hoffman, J. C. Hung, and D. Rosenberg

AN ANALYTICAL MODEL FOR OPTICAL DETERMINATION OF RESPIRABLE COAL DUST PARTICLE SIZE. *Inst. Elec. Electron. Engrs. (IEEE) Reg. Three Conv., Proc. 10th Annu. Meet., Knoxville, Tenn., 1972, p. V3-1 to V3-3. 4 refs. (April 10-12.)*

The Mie scattering theory and its use as a tool for calibrating optical monitoring instruments based on light scattering principles are discussed. Mie scattering applies when using source wavelength in the visible range and is concerned with scattering from solid particulates in the size range from 0.1 to 5 micron. The best source of light adapted to light scattering measurements is a laser which provides a beam of highly collimated, monochromatic light, thus allowing for significant amounts of measurable scattered irradiance. A computer program was used to obtain light scattering distributions for a number of particle sizes. Data was then plotted to relate size parameters to field patterns. This was then used to calibrate a light scattering instrument.

45 34 **APTIC NO. 65436**

Klein, Heinrich and Kurt Buick

PROBE FOR SAMPLING GAS WITH A HIGH DUST COUNT. *(Entnahmesonde fuer Gasproben hoher Staubbeladung). Text in German. (Siemens AG, Berlin and Munich (Germany)) W. Ger. Pat. Appl. 1,773,858. 2p., Feb. 24, 1972. 2 refs. (2 claims).*

Fine grained particles are separated from gases by a flow swirler. It consists of a tube swirl chamber with coaxial inlet for raw gas facing axial outlet for pure gas. An auxiliary gas inlet is designed as a ring gap between the outlet and inner lining of the chamber. An outlet gap for separated particles surrounds the inlet. Part flow of pure gas is taken as auxiliary gas from the outer zone of the pure gas outlet and fed back via a blower to the auxiliary gas inlet provided with guide blades. A small diameter vent is arranged in the pure gas outlet for actual gas samples.

45035 **APTIC NO. 65361**

Link, William T.

GAS ANALYZER. *(Analysengeraet). Text in German. (Akron Scientific Labs, Berkeley, Calif.) W. Ger. Pat. Appl. 2,127,994. 12p., Dec. 14, 1972. 6 refs. (8 claims).*

A gas analysis apparatus with high selectivity and sensitivity, whose output signal (result) is generally insensitive against losses at the optical boundary surfaces comprises: a fluorescence source containing (apart from the gas to be measured in the gas mixture), a further comparison gas compound capable of excitation for fluorescent emission and which is obtained from the compound to be measured by replacing more than one of its elements by one of its isotopes. The isotopic compound is preferably in the same container in the fluorescent source cell as the comparison compound. The measuring device is preferably a double beam apparatus, mainly used to measure carbon monoxide.

45036 **APTIC NO. 65366**

Sem, Gilmore J., John A. Borgos, Kenneth T. Whitby, and Benjamin Y. H. Liu

STATE OF THE ART: 1971 INSTRUMENTATION FOR MEASUREMENT OF PARTICULATE EMISSIONS FROM COMBUSTION SOURCES VOLUME III: PARTICLE SIZE. *Thermo-Systems Inc., St. Paul, Minn., Environmental Protection Agency Contract CPA 70-23, Program Element 1AA010, Rept. APTD-1524, 80p., July 1972. 101 refs.*

NTIS: PB 233393/AS

Candidate techniques for automatic or semi-automatic measurement of particle size distribution in combustion source effluents are discussed. Automatic or semi-automatic particle size measurements do not yet exist for this application. The application to effluent streams of particle size measurements used in other fields is considered. The discussion emphasizes the particulate concentration parameter (mass, number, and surface area) which each technique senses as well as the method of classifying particles into size ranges (aerodynamically, electrostatically, and optically). Included are descriptions of the basic operation of each technique, limitations of each technique, suggestions of possible major problems in applying each technique to effluent streams, and an overall evaluation of each technique relative to others. (Author abstract)

45037 **APTIC NO. 65299**

Wilder, B., Mirka Fugas, and F. Valic

ESTIMATION OF MAXIMUM AND MEAN DAILY CONCENTRATIONS OF SULPHUR DIOXIDE BASED ON TWO SAMPLES OF SHORT DURATION. *Sci. Total Environ., 1(2):165-171, Aug. 1972. 5 refs. (Presented at the International Clean Air Conference, 2nd, Washington, D. C., 1970.)*

A method for the estimation of maximum and mean daily concentrations of sulfur dioxide on the basis of the analysis of only one morning and one afternoon sample is proposed. The most suitable morning and afternoon sampling period must be determined for each sampling site from the mean diurnal SO2 pattern. On the days when the typical diurnal SO2 concentration pattern is disturbed, the estimated mean and maximum daily SO2 concentration must be corrected. The method is described for obtaining the correction factor from the ratio of the measured morning to the afternoon concentration. The correlation coefficient between the corrected estimated maximum daily SO2 concentration and the true maximum concentration is r equals 0.94, and the correlation coefficient between the estimated mean concentration and the true daily mean value is r equals 0.96, showing that the proposed method yields satisfactory estimates of these concentration parameters. (Author abstract modified)

1971

45038 **APTIC NO. 65439**

Huebner, Rolf H.

GAUGE FOR COMBUSTIBLE GAS CONCENTRATION IN AIR. *(Messgeraet zum Messen der Konzentration eines Gases in Luft). Text in German. (Assignee not given.) W. Ger. Pat. Appl. 1,598,578. 5p., April 1, 1971. 4 refs. (4 claims).*

The gauge comprises a pump which sucks a sample of the air-gas mixture into a measuring chamber and an electrical bridge circuit with two resistors at which there is combustion of the gas and two at which there is no combustion. The resistors are heated electrically and are located in the measuring chamber, and the two at which combustion takes place are arranged diagonally opposite one another in the bridge circuit. A measuring instrument with a pointer and two ranges extending in opposite directions from a common zero is connected to the bridge circuit. The gauge can be used for measurement of methane concentration in underground mines.

45039 **APTIC NO. 65420**

Ivlev, L. S. and V. I. Dmokhovskiy

EXPERIMENTAL METHOD OF STUDYING ATMOSPHERIC AEROSOLS. *Probl. Fiz. Atm., 9(9):28-38, 1971. 13 refs. Translated from Russian by Louise E. Heenan, Air Force Systems Command, Wright-Patterson AFB, Ohio, Translation Div., FTD-HT-23-807-73, 20p., Sept. 6. 1973.*

NTIS, DDC:AD 767 990.

Experimental methods that use lasers as sources of radiation in studying the optical characteristics of atmospheric aerosols are reviewed. The methods include: laser sounding, small scattering, angles and indicatrices, ultramicroscopic methods, photoelectric counters, and holography. The high specific density of energy in a laser beam makes it possible to operate with a comparatively small volume of aerosol and to study the local dynamic effects even with low aerosol concentrations.

1970

45040 **APTIC NO. 65354**

Herrmann, Pierre

CLEANING AND DRYING GAS FEED TO ANALYZER. *(Gasbehandlungsvorrichtung). Text in German. (Societe d Instrumentation Schlumberger, Paris (France)) W. Ger. Pat. Appl. 2,029,959. 4p., Dec. 23, 1970. 2 refs. (3 claims).*

The gas treater removes water and solid particles from a gas to be analyzed. The gas passes in succession through a cooling condenser, a wash separator with an outlet pipe, a filter for solid particles and an analysis chamber. The gas is circulated by a pump downstream of the chamber. The pump has its inlet connected to the lower part of a mixer, which receives the gas from the analysis chamber and is also connected to the water outlet pipe of the separator via a syphon. A branch of the outlet duct has an adjustable throttle directly connected to the gas outlet of the separator to the mixer, so that the pressure reduction in the mixer is reduced to a value compatible with a syphon of small height. The gas inlet of the analysis chamber opens nearly in the middle of the mixer.

1969

45041 **APTIC NO. 65460**

Coulter, Wallace H. and Walter R. Hogg

PARTICLE DETECTOR FOR PARTICLE SUSPENSIONS. *(Verfahren zur Festellung derjenigen Teilchengroesse (Scheidegroesse) eines Teilchensystems, oberhalb bzw. unterhalb welcher eine bestimmte Fraktion der Gesamtmasse des Systems liegt, und Vorrichtung zur Ausfuehrung dieses Verfahrens). Text in German. (Coulter Electronics, Ltd., Dunstable, Bedfordshire (England)) W. Ger. Pat. Appl. 1,806,456. 30p., June 19, 1969. 2 refs. (39 claims).*

The detector determines the particle size (separation size) above or below which a given fraction of the total mass of the system lies, whereby the particles in a sample of the system are scanned individually to obtain electrical pulses having parameters proportional to the particle volumes. A provisional separation size is selected and the pulses are divided into two categories depending on whether their parameters are above or below the parameters represented by this size. Both categories of pulses are converted into electrical signals proportional to the parameters and the two sums of these signals are compared. The provisional separation size is then varied until the ratio of the compared signals corresponds to the predetermined fraction.

1961

45042 **APTIC NO. 65057**

Stahl, Egon

ADSORPTION CHROMATOGRAPHY AND THE RAPID DETERMINATION OF ALUMINUM OXIDE ACTIVITY. *Chem. Z./Chem. App., no. 11:371-374, June 5, 1961. 12 refs. Translated from German, 10p.*

Adsorption chromatography is frequently the simplest and fastest method for separating lipophile mixtures into groups of approximately equal polarity. The use of thin-layer chromatography is more satisfactory than the use of closed columns. Economic considerations frequently favor the use of more simple column chromatography. It is possible to create optimal separation conditions by choosing an aluminum oxide with a suitable activity stage and an appropriate eluant. Separation in columns and in thin-layer chromatography is frequently improved by mixtures of two or three different strongly polar solvents to achieve a gradient column. The purity of the solvent, and in particular the water content, is of great importance in all adsorption chromatography separation methods. Separation conditions can also be improved by changing the aluminum oxides. A rapid test for the determination of aluminum oxide activity is described which is suitable for lecture demonstrations of chromatographic separation and which shows the meaning of the Brockmann activity stages.

AIR QUALITY MEASUREMENTS

1974

45043 **APTIC NO. 65268**

Baldwin, Thomas E. and Allen S. Kennedy

THE FEASIBILITY OF PREDICTING POINT SOURCE EMISSIONS USING INDUSTRIAL LAND USE VARIABLES: A PATH ANALYSIS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 24p., 1974. 6 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-145.)*

A causal regression analysis was used to investigate the feasibility of predicting point source emissions using industrial land use variables. Emission inventories collected by the City of Chicago Department of Environmental Control and the State of Illinois Environmental Protection Agency were used to group point source particulate emissions by 2 digit Standard Industrial Classification (SIC) and aggregated into light and heavy manufacturing operations. A general theoretical model was applied overall as well as to light and heavy aggregations of the region s 12 largest polluting SICs. The model postulates that land area and level of employment are useful in predicting the flow of material and fuel consumption which affect the particulate emissions of a given source. Land and employment were rather poor surrogates for predicting either material flow, energy use, or the attendant emissions from industrial sources and their use may yield erroneous inputs for modeling future air quality. (Author abstract modified)

45044 **APTIC NO. 65170**

Butler, J. D. and S. D. MacMurdo

AIRBORNE LEAD IN ABERYSTWYTH. *Brit. Med. J. (London), 2(5917):502, June 1, 1974.*

The possibility that high airborne dust concentrations derived from old mine workings in Aberystwyth, Wales, might have been the source of high blood lead levels in blood donors was studied. Particulate concentrations in the area were measured and lead concentrations determined. The mean values of lead for samplers facing southwest and northeast were 0.07 and 0.11 micrograms/cu m, respectively, lower than airborne lead levels in the air over Birmingham which were around 0.8 micrograms/cu m. Therefore, the airborne lead concentrations cannot be responsible for the high blood lead levels reported.

45045 **APTIC NO. 65226**

Chock, David P., Susanna B. Levitt, and Thomas R. Terrell

TIME SERIES ANALYSIS OF RIVERSIDE, CALIFORNIA AIR QUALITY DATA. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 35p., 1974. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-79.)*

A univariate analysis of the weekly averages of the daily maxima of oxidant, carbon monoxide, nitrogen dioxide, NO2, and total hydrocarbon covering the period June 1964 to June 1972 for Riverside, California is presented. Analyses of these data indicate that total hydrocarbons decreased by 3.2%/yr while CO increased 7.4%/yr. Increased CO in the face of total hydrocarbon decrease is contrary to what is expected, as well as what is actually found for Los Angeles. This anomaly may be due to an as yet undetermined change in the CO measurements whose yearly averages show a sudden increase of 3 ppm (35%) after 6/69. Oxidant had an increasing trend of 3.7%/yr while NO2 decreased by 1.6%/yr. This may be attributed to the increasing nitric oxide/HC ratio of the emission sources, which would shift the oxidant peak further east, downwind from Los Angeles and also slow down the morning NO2 produced locally in Riverside. The influence of weather parameters and other primary pollutants on air quality is also of interest. But due to the limitations of the data, only the relationships between the weekly averages of the daily maxima of oxidant and the weekly averages of several weather parameters were investigated during the period from 1963 through 1970. High serial correlations in the error term necessitated the use of models other than the ordinary least squares analysis. In particular, the Aitken s model, the lagged model, and the transfer function models were investigated. All models provide consistent values for the estimated powers of the three most important weather parameters, radiation intensity, wind speed, and temperature. The powers are respectively 1, -0.44 and 2. Both radiation intensity (UV in particular) and temperature are known to be influential in oxidant production while the dispersive effect of the wind is clearly manifested by its negative power. The effect of these weather parameters are multiplicative. The ability to handle the impulse and responses of a system renders the transfer function method very suitable for describing the hourly behavior of air pollutants since in this time scale, the effects of input impulses from weather and primary pollutants may be felt for several hours. (Author abstract)

45046 **APTIC NO. 65253**

Daniels, Anders

SIMULATION OF THE ENVIRONMENTAL IMPACT OF AN AIRPORT ON THE SURROUNDING AIR QUALITY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 25p., 1974. 19 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-122.)*

The simulation at an airport of those average and maximum pollutant concentrations which fall under the control of the Clean Air Act is described. Simulation of airport quality requires the accurate assessment of the temporal and spatial emission patterns. This involves the tabulation of air traffic density by type and engine, make and model of aircraft, and engine mode number; the use of fuel by different aircraft; the pollutant emission rates by engine model and operation mode; the allocation of emission rates to the respective runways, turn off points, taxiways, and parking areas; and the time each aircraft spends in the different operational modes. The resulting emission pattern for the Honolulu International Airport reflects scheduled and unscheduled commercial and military jet and piston aircraft and non-aircraft operations. Using this and the appropriate meteorological information average and maximum surface concentrations were calculated and compared with local ambient air quality standards. The calculation of concentrations is based on a newly developed diffusion model incorporating harmonic mean wind speeds for every degree of wind direction as determined by a Parzen maximum likelihood interpolation technique, and the assumption of log normal concentration distributions. The air quality standards are substantially exceeded for some pollutants which may have a considerable adverse impact on the surrounding air quality. (Author abstract modified)

45047 **APTIC NO. 68102**

Enders, Karl-Ludwig and Peter Peklo

EVOLUTION OF DUSTFALL IN THE BITTERFELD (EAST GERMANY) AREA. *(Entwicklung der Staubsedimentation im Raum Bitterfeld). Text in German. Chem. Tech. (Berlin), 26(7):424-426, July 1974. 6 refs.*

The expected effect of air pollution abatement measures planned in the Bitterfeld-Wolfen industrial area, the most polluted area in East Germany, is estimated by calculations for the 1971-1980 period on the basis of sulfur dioxide and dust emission data for 1971. In that year, the SO2 load was 473 tons/sq km yearly, against a countrywide average of 40 tons/sq km. The total dust emission in 1971 was 380,000 tons. The monthly and daily dust settling rates were 370 g/sq m/mo and a multiple of the limit of 15 g/sq m/day. Most of the SO2 and dust emissions are generated by power plants which are now scheduled for modernization and for conversion to natural gas and other environmentally acceptable fuels from brown coal and diesel fuel. The specific dust emission is expected to fall from 7 kg/ton of steam in 1971 to about 0.6 kg/ton in 1980. Calculations of the rate of dust settling as affected by the planned measures revealed reductions by 70-80% in the settling dust by 1980 as compared with the 1971 level. A comparison of the calculated with the measured values of the settling dust revealed that calculated values are 27% lower than the measurement data, and that the divergences are highest for the immediate neighborhood of the emission sources.

45048 **APTIC NO. 68087**

Foglio Para, Armando and Mirella Mandelli Bettoni

DETERMINATION OF CERTAIN TRACE ELEMENTS PRESENT IN THE AIR IN MILAN BY NEUTRON ACTIVATION ANALYSIS. *(Analisi per attivazione neutronica nella determinazione di alcuni elementi presenti in tracce nell atmosfera di Milano). Text in Italian. Chim. Ind., 56(5):341-346, 1974. 11 refs.*

Trace elements in dust samples collected in Milan, Italy, were determined by neutron activation analysis. The dust samples were taken at 10 m altitude above ground level by means of Poelman-Schneider filters during the 1968-1972 period. The trace elements analyzed in the samples were aluminum, antimony, bromine, chlorine, iron, manganese, sodium, scandium, vanadium, and zinc. Pronounced seasonal variation was observed with maxima in winter and minima in summer for the concentrations of bromine, chlorine, manganese, sodium, vanadium, and zinc. The mean values were 1.72 micrograms/cu m for aluminum, 0.06 micrograms/cu m for antimony, 0.45 micrograms/cu m for bromine, 4.68 micrograms/cu m for chlorine, 6.49 micrograms/cu m for iron, 0.5 micrograms/cu m for manganese, 0.00042 micrograms/cu m for scandium, 2.1 micrograms/cu m for sodium, 0.22 micrograms/cu m for vanadium, and 3.47 micrograms/cu m for zinc. Correlation analyses revealed especially close correlations between the bromine and chlorine and manganese-zinc concentrations with the respective correlation factors of 75-96 and 91-98.

45049 **APTIC NO. 65572**

Frank, Neil H.

TEMPORAL AND SPATIAL RELATIONSHIPS OF SULFATES, TOTAL SUSPENDED PARTICULATES AND SULFUR DIOXIDE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1974. 8 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-245.)*

Long-term trends and geographical patterns among atmospheric suspended sulfate concentration levels are considered for the period 1964-1970, with measurements obtained from the high-volume samplers of the National Air Surveillance Network (NASN). The data are placed in perspective by comparing them with patterns observed for total suspended particulate matter (TSP) and sulfur dioxide (SO2), and by examining some factors influencing sulfate formation. Long-term temporal patterns were established on the basis of rank correlation of annual geometric mean pollutant levels with time. With few exceptions, mean sulfate levels have stayed essentially unchanged during a period in which numerous downward trends in TSP and SO2 were observed. The observed decreases in TSP consisted of changes in the nonsulfate portion of TSP and, as a consequence, the percentage of sulfate in TSP consistently increased during the study period 1964-1970. Geographic variation was observed among mean sulfate concentrations as well as among their corresponding percentages of TSP. The highest sulfate levels are situated in the northeastern U. S. where the highest ambient SO2 and sulfur emissions are also found. Sulfate concentrations, however, are not clearly related to ambient SO2 concentrations at individual locations and can be better described by the concentration of TSP and the general geographic locality of the monitoring station. (Author abstract)

45050 **APTIC NO. 65566**

Hall, John S., Louis A. Riley, and Mikolaj Jerzykiewicz

HIGHLY ACCURATE EXTINCTION MEASUREMENTS FOR SENSITIVE ASSESSMENT OF AIR QUALITY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 18p., 1974. 9 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-238.)*

The significance of accurate measures of atmospheric extinction made at the Lowell Observatory at Flagstaff, Arizona is discussed. Measurements of horizontal extinction were initiated in January, 1972, and by October, 1973 an instrumental accuracy compatible with the best observing conditions was achieved. Excellent data obtained in a horizontal direction during a seven-night run are compared with long-term highly standardized astronomical measures of extinction obtained at Flagstaff during the period 1955-1972. The data obtained both vertically and horizontally suggest that the extinction and scattering due to aerosols were at times as low as 10% of that caused by molecular (Rayleigh) scattering alone. The vertical extinction seems to correspond (with several months lag) to rough estimates of volcanic loading; the effect of the March 17, 1963 outburst of Mount Agung, a volcano on the island of Bali, very probably caused abnormally high extinction in late summer of that year. A generally high extinction level was observed throughout 1964-1965 with a rather slow decay to a normal level showing up by 1966. The very high level of transparency and abnormally blue sky found in 1961 was again observed in 1972. These data strongly suggest that man-made aerosols are not yet the major contributor to the particulate matter in the upper atmosphere. (Author abstract modified)

45051 **APTIC NO. 65584**

Jones, Peter W.

ANALYSIS OF NONPARTICULATE ORGANIC COMPOUNDS IN AMBIENT ATMOSPHERES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 19p., 1974. 22 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-265.)*

The collection of atmospheric vapors using a solid adsorbent, and the subsequent analysis of the sample by gas chromatographic-mass spectrometry are described. Samples were collected from four different urban atmospheres. A survey was made of the nature of compounds found in widely differing atmospheres. Many pollutants are common to all atmospheres, most probably as a consequence of fossil fuel combustion, but others appear to be a consequence of specific industrial operations. The diurnal variation studies at one location highlight the differences in concentration profiles between substances which appear to originate from fossil fuels, and those which are more likely to be industrial effluents. The detection of trace quantities of atmospheric ethylene sulfite with the aid of mass fragmentometry is discussed. This compound is formed from the photochemical reaction of sulfur dioxide with ethylene, and is a potential carcinogen. (Author abstract)

45052 **APTIC NO. 65641**

Kojima, Hiroshi and Toshio Sekigawa

AEROSOLS IN URBAN ATMOSPHERE. *(Toshi taikichu no earozoru ni tsuite). Text in Japanese. Taiki Denki Kenkyu (Proc. Soc. Atmos. Electr. Jap.), no. 10:14-17, Feb. 1974.*

The Pollack counter was miniaturized to make it portable. The modification was made to use direct current as a power source, and all recording mechanisms were made automatic. The accuracy and sensitivity were maintained at the existing level. The modified Pollack counter with expansion chamber (26 cm in diameter, 60 cm in length), auxiliary chamber (2.6 l in capacity), and piston is shown with a schematic diagram. The time required for one measurement is set at 90 sec. For the horizontal distribution measurement in the Tokyo metropolitan area, the counter was loaded on a car with an air inlet located at the front of the car. Measurement while driving was impossible due to the effect of exhaust gas emitted from other moving vehicles. The particulate concentration was measured in relatively higher and lower concentration periods of the day with northwestern wind at 2-5 m/sec velocity. The average concentration was higher in the southern area of metropolitan Tokyo than in the northern area. The particulate concentration at roadside was extremely high, and it decreased exponentially with the distance from the road. Within 100 m of the road, the distance from the road is an important factor in determining the particulate concentration.

45053 **APTIC NO. 65654**

Masek, Vaclav

BENZO-3,4-PYRENE IN RESPIRABLE AND NON-RESPIRABLE PARTS OF THE FLY DUST FROM COKING PLANTS. *(3,4-Benzpyren in lungengaengigen und nicht lugengaengigen Teilen des Flugstaubes der Kokereien). Text in German. Zentr. Arbeitsmed. Arbeitsschutz, 24(7):213-219, 1974. 8 refs.*

The DP 50, a Czechoslovakian unit with a microcyclone separating the non-respirable dust and a shaped analytical filter for retention of the respirable dust fraction and the familiar BAT I, manufactured in the Federal Republic of Germany, were used for collecting 24 twin samples from 5 hard coal coking plants and 16 twin samples from 4 stations in a pitch coking plant. The mathematical relationship between the totally collected dust and the respirable dust fractions obtained with the DP 50 and the BAT I is shown in a table. Correlation coefficients between 0.7 and 0.9 were obtained. For the respirable dust samples obtained with the two samplers the grain size and its numerical and quantitative distribution were determined. For the average grain size of 2.00 micron the numerical and weight distributions for samples obtained with the DP50 sampler were 8.03 and 4.40, for samples obtained with the BAT I, 6.05 and 3.03. For quantitative determination of the benzo-3,4-pyrenes the samples were extracted with benzene followed by thin layer chromatography with activated alumina in a cyclohexane - benzene environment. For quantitative determination of the identified benzo-3,4-pyrene spots photometry was used. On the average, the respirable dust fractions from both kinds of coking plants contained somewhat less benzo-3,4-pyrene than the non-respirable fractions. The benzo-3,4-pyrene concentration in respirable dust from the hard coal coking plant was lower than that in samples from the pitch coking plant. The difference between the benzo-3,4-pyrene concentration in samples taken with the DP50 and the BAT I was negligible.

45054 **APTIC NO. 65173**

Mashima, Michio and Rikitaro Hirano

CHARACTERISTICS OF CHANGES OF SULFUR OXIDES CONCENTRATION ON GROUND LEVEL IN THE NIIGATA EASTERN PORT AREA UNDER CONSTRUCTION. *(Kensetsuchu no Niigata higashi minato chiiki ni okeru io sankabutsu no chihyo nodo no keinen henka no tokushoku ni tsuite). Text in Japanese. Preprint, Japan Chemical Society, p. 13, 1974. (Presented at the Japan Chemical Society, Hokkaido Branch, Summer Meeting, Kitami, Japan, July 25-26, 1974.)*

Sulfur oxides concentrations were measured from June 1971 to 1973 at a location 5 km from the eastern port area where fertilizer manfacturing plants were constructed. The fertilizer plants started their operations in June 1971 while a power plant began operating in December 1972. The SOx concentrations were measured with a GR-3 type air pollution meter, and the results were checked several times by the rosaniline formalin method. The standard errors were under 4 ppb. The concentration in June 1971 to August 1971 was especially low due to the breakdown of part of the industrial plants. The highest hourly average concentration in June to August of 1972 was at about 7:00 pm, and was at 4:00 pm in June to August of 1973. The average concentration in 1972 was 17.1 ppb, and the total number of days having an average concentration of more than 20 pphb was 85. The high SOx concentration was attributed to high sulfur content (2.5 to 3 wt%) in the heavy oil being used as fuel and to stacks which were not properly functioning.

45055 **APTIC NO. 68070**

Murakami, Taizo

AIR POLLUTION IN OSÁKA PREFECTURE CENTERING AROUND THE IKOMA MOUNTAIN RANGE. (REPORT NO. 2) AIR POLLUTION IN THE EASTERN OSAKA PLAIN FROM KINKI UNIVERSITY TO THE FOOT OF MOUNT IKAMA. *(Ikomasan kei o chushin to shita Osaka fuka no taiki osen. (Dai-2-ho) Kinki daigaku o kiten to shita Ikoma sanroku ni tsuitaru Higashiosaka heiya no taiki osen). Text in Japanese. Kinki Daigaku Kogai Kenkyusho Kenkyu Hokoku (Kinki Univ. Pollut. Res. Inst. Rep.), no. 2:79-99, Oct. 1974. 6 refs.*

The air pollution in the area from the west side of Ikoma mountain to Higashiosaka city and Hachio city were surveyed. The concentrations of suspended particulate, sulfur dioxide, carbon monoxide, oxidant, and nitrogen dioxide were measured along with meteorological factors at 25 measuring stations in 1972 and 17 measuring stations in 1973 for a period of 10 days in the summer and fall. The descriptions of various instruments used for measurements are given with photographs. The measurement results obtained were analyzed in terms of daily average and maximum and minimum values with regard to meteorological factors and evaluated in reference to environmental standards. The data obtained were also compared with those of previous years. At many locations a general trend of decreasing pollutant concentration was observed.

45056 **APTIC NO. 68080**

Navarrete, M., L. Galvez, E. Tzontlimatzin, and C. Aguilar

DETERMINATION OF PARTICULATE AIR POLLUTANTS IN MEXICO CITY USING ACTIVATION ANALYSIS. *Radiochem. Radioanal. Lett., 19(3):163- 170, Oct. 25, 1974. 12 refs.*

Activation analysis of particulate samples taken during 24-hour periods over Mexico City with an air sampler was employed to determine the main sources and mechanisms of particulate pollution in the area. Irradiations were performed with a nuclear reactor, and gamma spectra were taken using a germanium-lithium detector. High concentrations of aluminum, calcium, manganese, magnesium, potassium, and sodium led to the inference that a significant source of contamination in Mexico City was represented by salty soils with a negligible moisture content. The placing of massive amounts of calcium chloride or other cheap hygroscopic substances over large areas formed by the bottom of the desiccated lakes surrounding the northeast boundary of the city was proposed since these salty areas are quite useless for agriculture and represent the main source of contamination.

45057 **APTIC NO. 65395**

Nees, W. L. and J. P. Corley

AIR QUALITY. *In: Environmental Surveillance at Hanford for CY-1973. Battelle Memorial Inst., Richland, Wash., p. 25, 30, April 1974.*

NTIS: BNWL-1811, UC-41, Health and Safety

The Hanford nuclear reactor and coal-fired steam plants emit some sulfur oxides, nitrogen dioxide, and particulates. Concentrations of these particulates were measured in the area of the Richland, Wash., plant. The highest average NO2 concentration for any location was 0.007 ppm, 14% of the Federal Air Quality Standard. All sulfur dioxide samples were less than the detection level of 0.005 ppm, 20% of the Washington State Standard. Suspended particulates varied over a wide range due to heavy dust storms typical of the area. Fluctuations of NO2 and particulates were attributed to nonplant sources.

45058 **APTIC NO. 65710**

Ose, Y., H. Ukai, K. Sasaki, T. Ikeda, M. Sekiya, S. Nakashima, H. Akagi, K. Nakamuro, N. Morisaki, T. Ishikawa, R. Funasaka, Y. Tanaka, K. Shiraki, H. Niwa, and H. Inoue

STUDIES ON PUBLIC NUISANCE CAUSED BY AIR POLLUTION, VI: ENVIRONMENTAL POLLUTION CAUSED BY TRAFFIC IN GIFU CITY. *(Taiki osen ni motozuku kogai ni kansuru kenkyu). Text in Japanese. Gifu Yakka Daigaku Kiyo (Ann. Proc., Gifu Coll. Pharm.), no. 22:16-22, March 1974.*

Air quality measurements were taken at five main intersections of Gifu City in 1966 and 1967, and at five locations on streets reaching intersections but not affected by heavy traffic, in 1968 and 1969. Traffic counts, wind direction and velocity, temperature, humidity, carbon monoxide, sulfur dioxide, nitrogen oxides, and dusts were measured in summer, fall, and spring, on weekdays from 7 am to 7 pm. The CO was measured by colorimetry, SO2 by the Rosanylin formaline method, NOx by azo dye colorimetry, and dusts by filter paper. The CO levels increased drastically between 1966 and 1967, and also in less busy streets between 1968 and 1969. The average concentration in the busiest section in the spring of 1966 was 20.9 ppm, but increased to 37.3 ppm in 1 year. The highest average of the less busy section was 13.6 ppm in the spring of 1968, but increased to 30 ppm in 1969. This might not have been caused by automobiles waiting to cross a railroad track at this monitoring spot. Compared with other major cities of Japan with populations between 200,000 and 500,000, the total average of which was 10.2 ppm for 1968 and 1969, at least one location in Gifu exceeded that level in each of three seasons in 1968. In 1969, one location in summer, two locations in fall, and four locations in spring exceeded the level. The standard hourly average for SO2 (0.1 ppm) was exceeded only once at each location. A few intersections exceeded hourly averages of 0.1 ppm NOx.

45059 **APTIC NO. 65583**

Ruud, Clayton O. and Ralph E. Williams

X-RAY AND MICROSCOPIC CHARACTERIZATION OF DENVER (1973) AEROSOLS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1974. 2 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-264.)*

A means of characterizing or ascertaining the effect of aerosol particulates in the atmosphere is presented. The preliminary microscopy and X-ray microanalysis results presented are a portion of a study in which the ultimate objective is to characterize the nature and behavior of the aerosol species contained in the Denver Brown Cloud. The object of the scanning electron microscopy and X-ray microanalysis study reported herein was to qualitatively ascertain the distribution characteristics of aerosol particles in one set of cascade impactor samples and to characterize the particulates collected on the backup filter of this set. The radial distribution of various particulate species was not uniform over the later stages of the cascade impactor. On a numerical basis the major aerosols are minerals, flyash, and auto emission-related particles. (Author abstract)

45060 **APTIC NO. 65252**

Sklarew, Ralph C.

ASSESSING AIR POLLUTION IMPACT FROM ONE AMONG MULTIPLE EMISSIONS SOURCES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1974. (Presented at the Air Pollution Control Association Annual*

Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-121.)

Ambient air monitoring data for impact studies are analyzed using trajectory mapping, chemical fingerprinting, and pollution aging. A single emission source of nitrogen oxides was studied in a region encompassing a plain and mountain foothills. Emissions from the single source accounted for approximately 20% of the NOx emitted on the plain. On the same plain was another source with similar emissions, other industrial processes with emissions of the same pollutants, and motor vehicles. The measurements emphasized a dense network of fixed, ground level air monitoring stations. At each station ambient levels were measured for nitrogen dioxide, nitric oxide, sulfur dioxide, carbon monoxide, total oxidant, and total hydrocarbons. This network gave good definition of the ambient pollutant levels and patterns throughout the plain and well into the foothills. The emissions of the single source were measured and those of adjacent sources were reviewed as compiled by others. This methodology can be used to estimate the environmental impact of one point source in a total area source.

45061 **APTIC NO. 65367**

Office of Air and Water Programs, Research Triangle Park, N. C., Monitoring and Data Analysis Division

AIR QUALITY DATA- 1972 ANNUAL STATISTICS. *Rept. EPA-450/2-74-001, 137p., March 1974. 3 refs.*

NTIS: PB 232588/AS

In accordance with requirements of the Clean Air Act and EPA Regulations for State Implementation Plans (SIP s), ambient air quality data resulting from air monitoring operations of State, local, and Federal networks are presented for the year 1972. All data submitted to the National Air Data Branch must meet summary criteria based on the sampling interval before the arithmetic and geometric means and standard deviations will be calculated. For non-continuous sampling intervals (24 hr or greater), a minimum of five samples must be collected in each quarter. If no samples are collected in one month, neither of the other two months in that quarter may have less than the two samples reported. For continuous sampling (less than 24 hours) each quarter must have at least 75% of the total number of possible operations reported to the NADB. The pollutants measured were particulates, sulfur dioxide, carbon monoxide, nitrogen dioxide, oxidants, ozone, and hydrocarbons. (Author summary modified)

45062 **APTIC NO. 65628**

Kanagawa Prefectural Pollution Control Center (Japan)

LOCAL POLLUTION BY OXIDANTS IN THE ISEHARA DISTRICT. *(Isehara chiku ni okeru okishidanto to ni yoru chiiki osen). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 16:65-69, Feb. 1974. 1 ref.*

Measurements of oxidants and ozone were taken in the Isehara area between August 12 and September 30, 1973. Oxidants were measured by automatic continuous meters with potassium iodide, and ozone was measured by automatic meters utilizing chemiluminescence. The total average for oxidants was 0.05 ppm at the Naruse Junior High School and 0.04 ppm at Oyama Public Hall; ozone was 0.03 ppm at the Naruse Junior High School. The highest oxidant measurements, 0.25 ppm at Naruse and 0.17 ppm at Oyama, were noted on August 20. The relationship of ozone to oxidant in 1972 was 62% to 100% and correlation was 0.98. For summer 1973, these figures were 75% and 0.97. A cycle of eight days was noted in the oxidant concentration fluctuation, and this was conjectured as the wind velocity cycle.

45063 **APTIC NO. 65629**

Kawasaki Municipal Hygienic Research Inst. (Japan)

METAL ELEMENTS IN SETTLING PARTICLES. *(Koka baijinchu no kinzoku seibun ni tsuite). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama- Kawasaki Ind. Area), no. 16:45-55, Feb. 1974.*

Among the continuously monitored locations in Kawasaki, nine locations were selected from the industrial, sub-industrial/commercial, commercial/residential, and farming areas, and the lead, cadmium, copper, manganese, iron, nickel, vanadium, and chromium contents in settling particles were analyzed. The metal concentration distribution and the relationship between V and sulfur dioxide were also studied. Samples were taken by deposit gauges between April 1971 and March 1973, and metals were analyzed once every month. The Pb, Cd, Cu, Mn, and Cr concentrations were analyzed by atomic absorption spectrophotometry, and Fe, Ni, and V were analyzed by colorimetry. In all areas, the amount of Fe was extremely high, ranging from the lowest of 125 kg/sq km/mo to 13,648 kg. The Mn, Pb, and Cu quantities were also relatively high. The Cd was found least in each area, ranging from the minimum of 0.02 to 1.16 kg/sq km/mo. The ratio of each metal to the total settling particles was 10% for Fe, 0.13% for Mn, 0.07% for Pb, 0.05% for Cu, 0.03% for V, 0.02% for Ni and Cr, and 0.002% for Cd. For all metals, the measurements in the industrial area were the highest, followed by sub-industrial/commercial, commercial/residential, and farming areas. The ratios of metals in other areas and the farming area were 9.8(Cu)-1.5(Cd) in the industrial area in the sub-industrial/commercial areas, 3.8(Cr)-1.2(Cd); and in the commercial/residential area, 1.6(Cr)-0.8(Cd). The amounts of Fe, Cu, and Mn in the industrial area were 9.8, 6.4, and 5.6 times over those of the farming area, respectively. The correlation coefficient for V and SO2 was 0.90, both coming from the same emission sources of oil combustion installations.

45064 **APTIC NO. 65630**

Kanagawa Prefectural Pollution Control Center (Japan) and Kanagawa Prefectural Assoc. for Pharmacists (Japan)

THE GEOGRAPHICAL DISTRIBUTION OF AERIAL HEAVY METAL CONCENTRATIONS IN KANAGAWA PREFECTURE. *(Kanagawa-ken ni okeru taikichu jukinzoku nodo no chiiki bunpu). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama- Kawasaki Ind. Area), no. 16:25-44, Feb. 1974.*

The heavy metal concentration in suspended particulates was measured at 15 locations in Kanagawa Prefecture between May 1972 and March 1973. The metals analyzed by atomic absorption spectrophotometry were lead, cadmium, manganese, nickel, iron, and chromium. Suspended particulates were sampled on the grounds and on roofs of tall buildings for 24 hours by high-vol air samplers and with glass fiber filter paper. The highest measurements were 2.8 micrograms/cu m of Pb and 0.16 micrograms/ cu m of Cd, but they were both lower than the provisional environmental standards set until the bills are passed. In each category, the measurements were higher in the industrial belt than in middle or West Kanagawa. The ratio of concentrations in the industrial areas and in western Kanagawa were 4.7:1 for Pb, 9.6:1 for Cd, 4.3:1 for Mn, 12.4:1 for Ni, 2.5:1 for Fe, 19:1 for Cr, and 2.2:1 for suspended particulates. The measurements of Mn and Fe, as well as total suspended particulates were generally higher in winter, but Pb, Cd, Ni and Cr showed no special monthly or seasonal patterns. The Cr had considerably daily fluctuations. The concentrations on the ground and on roofs had high correlations. Generally, measurements on the ground were slightly higher except for Cr and Ni.

45065 **APTIC NO. 65631**

Kanagawa Prefectural Pollution Control Center (Japan)

ENVIRONMENTAL INVESTIGATION ON AUTOMOTIVE EMISSION GASES AT MAIN TRAFFIC INTERSECTIONS IN THE PREFECTURE. *(Kenka no shuyo kosaten to ni okeru jidosha haishutsu gasu kankyo chosa kekka) Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 16:56- 64, Feb. 1974.*

Automobile exhaust gases in the environment are continuously monitored at the main highways and intersections in Kanagawa Prefecture. The measurements of carbon monoxide, nitrogen oxides, and lead were taken at 11 main locations, and the wind velocity, the wind direction, and the traffic amounts were checked between Sept. 1971 and Sept. 1973. Nondispersive infrared spectrometry was used for CO, the Saltzman method was used for NOx, and a high-vol sampler and atomic absorption spectrophotometry were used for Pb. The total average for 8-hr measurements of CO was 5.2 ppm/hr, with the maximum of 18.5 ppm/hr, and the total average for the 24-hour measurements was 3.1 ppm/hr with the maximum of 7.6 ppm. The total monitoring average for nitrogen dioxide was 0.048 ppm/day which was about twice the environmental standard. The daily average of nitric oxide was 0.058 ppm. The lead level was 1.5 micrograms/ cu m, with the highest of 2.2 micrograms, and was within the environmental standard. An overall view of all the measuring locations was not clear, and there was no proportionate relationship between the amount of traffic and CO; but individually, there was a slight correlation between them. The concentration of CO on the roadside was affected by the distance from the road itself and by buildings in the back. In order to maintain the less than 4 ppm/hr level for CO, it was necessary to move at least 5 m away from the highway in an open area without any building in the back.

45066 **APTIC NO. 65632**

Yokohama Municipal Pollution Control Bureau (Japan) and Kawasaki Municipal Pollution Control Bureau (Japan)

THE STATE OF AIR POLLUTION: AIR POLLUTION IN THE TOKYO-YOKOHAMA INDUSTRIAL BELT. *(Taiki osen no jittai: Keihin kogyo chitai no taiki osen). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 16:7-24, Feb. 1974.*

As part of air pollution monitoring in the Tokyo-Yokohama industrial belt, settling particles were measured in 1972 at 17 locations in Yokohama and nine locations in Kawasaki. Yokohama utilized deposit gauges and Kawasaki utilized dust jars. All measurements were converted to dust jar level. The highest level in Yokohama was at the Toshiba Electric Co. Tsurimi Plant where 14.7 tons/sq km/mo of dusts were collected, and the minimum was 5 tons/sq km/mo at an apartment in the commercial/residential area. The maximum in Kawasaki was 42.8 tons at the Mitsubishi Petroleum Factory, and the minimum was 5.3 tons at a farming area. Depending on the type of area, monthly averages ranged in Yokohama from 5.8 tons to 13 tons/sq km/mo, and in Kawasaki from 5.3 to 29.2 tons. Sulfur oxides were monitored in 1972 at 33 locations in Yokohama and 18 locations in Kawasaki. In both cities the lead dioxide method was employed. The maximum in Yokohama was 1.62 mg/SO3/100 sq cm/day at the Toshiba Electric Tsurumi Plant, and the minimum was 0.09 mg in a farming area. The maximum in Kawasaki was 3.50 mg in a sub-industrial area, and the minimum was 0.50 mg in a farming area. The annual averages in Yokohama were 1.11 mg in industrial areas, 0.71 mg in sub- industrial areas, 0.50 mg in commercial/residential areas, and 0.22 mg in farming areas. In Kawasaki annual averages were 2.56 in industrial areas, 2.81 in sub-industrial areas, 1.28, 0.99, 1.16, and 0.61 mg in commercial/residential areas, and 0.50 mg in farming areas.

45067 **APTIC NO. 65643**

Nishinomiya Municipal Government (Japan)

POLLUTION IN NISHINOMIYA CITY (NO. 5), 1973. *(Nishunomiay-shi no kogai). Text in Japanese. 139 p, Feb. 1974.*

Surveys of Nishinomiya s industrial development, terrain, topography, organization and administration, pollution complaints, the state of air pollution, water pollution, noise and vibration, odors, land settling, weather, the 1973 enforcement of pollution prevention agreements, monitoring programs, children s health examinations, regulations, traffic investigations, and control measures are presented. The monitoring system includes three continuous, automatic monitoring stations for the air quality, three automotive emission monitoring stations, and a telemeter system connecting these stations will be finished by the end of 1973. In addition, sulfur oxides are measured by lead dioxide methods at 15 points, and settling particles are measured by deposit gauges at 8 points. The SOx level was high in 1965 and 1967, but the level decreased suddenly after 1968, the 1972 average was 0.025 ppm at the city hall. The entire city s average for settling particles was 6.63 tons/sq km/mo in 1972. There were fewer areas with more than 8 tons/sq km/mo than in 1971. The level of suspended particulates was higher in winter and but the year s average was between 0.027 mg and 0.036 mg/cu m. The ratio of failure to pass the environmental standards was between 0.5 and 2.3% and has decreased much over the years. However, the level of nitric oxide was 0.028 ppm, and nitrogen dioxide 0.028 ppm, and 82.2% or 281 days in 1972 failed to comply with the environmental standard of 0.02 ppm.

45068 **APTIC NO. 65646**

Mie Prefecture (Japan)

WHITE PAPER ON ENVIRONMENT, 1973. *(Kankyo Hakusho). Text in Japanese. 314p., March 1974.*

The average of sulfur oxides measurements at six monitoring points in Yokkaichi was 0.034 ppm in 1970, 0.032 ppm in 1971, and 0.026 ppm in 1972, all of which passed the environmental requirements of the old standards. The petroleum industrial complex of the Yokkaichi area consumes approximately 4,240,000 kl of fuel a year and emits 75,200 tons of sulfur dioxide gas. The passing rate for the suspended particulates environmental standard is about 84%. The highest annual average was 0.204 mg/cu m, and the lowest was 0.119 mg/cu m. The metal composition analyzed by spetrophotomery was, for 1972, 3.40-1.85 microgram/cu m of iron, 0.14-0.09 microgram/cu m of manganese, and 0.24-0.11 microgram/cu m of lead. Others were copper, nickel, vanadium, cadmium, and chromium in moderate to traceable amounts which were not particularly high compared to other cities. The settling particle amount for 1972 decreased by 15%, but was still rather high compared to other cities. The highest monthly average was 15.4 ton/sq km/mo and the lowest was 5.8 tons/sq km/mo. The oxidant levels in 1972 exceeded the standard of 0.15 ppm hourly measurement seven times at each of two monitoring stations. The maximum hourly measurements were 0.17 to 0.23 ppm, and daily averages were 0.070 to 0.081 ppm. Nitrogen oxide measurements were particularly poor and 53% of the total monitoring days exceeded the standard.

1973

45069 **APTIC NO. 65347**

Desbeaumes, P.

AIR POLLUTION MONITORING IN GENEVA. *Beckman Instruments Process S.A., Geneva (Switzerland), Proc. Int. Symp. Environ. Meas., Geneva, Switzerland, 1973, p. 123-130. (Oct. 2-4.)*

Sulfur dioxide, black smoke (soot), carbon monoxide, nitrogen oxides, dust, hydrocarbons, carcinogens, and atmospheric precipitation composition (sulfates, chlorides, nitrates, ammonia, metals, dry extracts) were measured in Geneva s air.

Measurement instrumentation, the monitoring system, and results are presented. For 1970, SO2 concentrations were 33 g/cu m, black smoke 50 g/cu m, NOx 0.038 ppm, and CO 10 ppm. Geneva had a low SO2 content, but concentrations of black smoke and NOx were not very different from those found in the polluted air of Paris.

45070 **APTIC NO. 65293**

Flyger, H. and W. J. Megaw

MEASUREMENT OF THE BACKGROUND TROPOSPHERIC AEROSOL. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 42, Aug. 1973. 3 refs. (Complete text not available through APTIC.)*

Essential requirements for an area in which reliable measurements of the properties of the background tropospheric aerosol can be made and past and present trends established are discussed. Reasons are given which led to the choice of the air over Greenland as a unique and almost ideal location for work of this nature. Details of the instrumentation, installed in a light aircraft, for the sampling and measurement of the properties of the tropospheric aerosol are given, and the results from a preliminary expedition to Greenland in the summer of 1971 are presented and discussed. (Author abstract)

45071 **APTIC NO. 65656**

Hasegawa, T.

PRESENT STATUS OF AIR POLLUTION IN THE OSAKA-KOBE INDUSTRIAL AREA. *(Hanshin kogyo chitai no taiki osen no genjo). Text in Japanese. Kuki Seijo (Clean Air - J. Japan. Air Cleaning Assoc., Tokyo), 11(6):33-48, Dec. 1973.*

Air pollution in the Osaka-Amagasaki industrial area is described. Consumption of heavy oil increased from 5.17 million kl in 1967 to 8.62 million kl in 1971 in Osaka, while in Amagasaki, the consumption decreased from the 1969 level of 1.98 million kl to 1.77 million kl in 1971. The sulfur content in the heavy oil of Osaka decreased from 2.27% in 1967 to 1.28% in 1971, and from 1.82% to 1.21% in Amagasaki over the same time span. The discharge of sulfur oxides decreased gradually in Osaka from the 1967 level of 290,000 tons. In 1971, SOx emissions in Amagasaki were at 50,000, as compared to the discharge of 90,000 tons in 1969. The SOx concentration at 12 monitoring spots in Osaka in 1971 averaged 0.042-0.65 ppm. This is an improvement over the preceding year, it exceeded the environmental standard. Four monitoring stations in Amagasaki averaged 0.028 ppm, 0.047 ppm and 0.056 ppm. In 1972, Osaka maintained a level 0.05 ppm below the environmental standard at 23 spots, and Amagasaki, 0.028-0.041 ppm. Aerosols in Osaka averaged 298 micrograms/cu m to 98 micrograms/cu m in 1971. Metal contents in aerosols were iron, lead, and vanadium. Dust in the industrial area in Osaka totalled 15.40 tons and averaged 10.79 tons in 1971, which had decreased from 16.49 tons in 1966. In 1971 the carbon monoxide level in a certain spot in Osaka exceeded 30 ppm 16 days a year, and the environmental standard of less than a 10 ppm average over 24 hr was exceeded 1193 times. In Amagasaki, the CO range was 2.5-4.6 ppm. Nitrogen oxides are measured at 13 spots in Osaka in 1971. While nitric oxide averages at spots of general environmental condition was 0.023-0.058 ppm, traffic in measurement areas raised the average to 0.078-0.291 ppm. Nitrogen dioxide in random areas was 0.038-0.060 ppm/yr, while in traffic, 0.041-0.111 ppm. Heavily travelled areas provided over 0.5 ppm hourly averages 11 days in 1 yr. In Amagasaki, the annual average of NO2 ranged among 0.040, 0.035, 0.030 ppm, while NO ranged among 0.041, 0.035 and 0.030 ppm. The oxidant maximum in 1971 in Osaka was 0.27 ppm, and at 11 out of 17 monitoring stations, an hourly measurement of 0.15 ppm was registered. In Amagasaki, the maximum hourly figure in 1971 was 0.095 ppm.

45072 **APTIC NO. 65286**

Jaenicke, R.

MONITORING OF AEROSOLS BY MEASUREMENT OF SINGLE PARAMETERS. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 29-31, Aug. 1973. 4 refs. (Complete text not available through APTIC.)*

While the size distribution of aerosols is difficult to determine measurements of parameters like mass concentration, total number concentration, turbidity, and electrical conductivity can be easily done and incorporated into a monitoring network. Some of these parameters have been measured for 50 years, and trends in their results have been observed. Measurements of the effect to be monitored in a restricted volume of aerosol always follows an equation. Under the assumption of the present distribution for continental aerosols, the following intervals have been computed for various parameters within the limits 5% and 95%, where an interval is defined by the criterion that 90% of the measured values of a parameter fall within it: Overall traditional particle number concentration equals 0.0000005-0.000015 cm; overall particle number concentration extrapolated from Jaenicke equals 0.000001-0.00001 cm; electrical conductivity of aerosol equals 0.000004-0.00005 cm; extinction coefficient equals 0.000012-0.0004 cm; overall mass concentration equals 0.0001-0.005 cm; and sedimented mass equals 0.001-0.009 cm.

45073 **APTIC NO. 64987**

Kitagawa, Yoshio, Kiyoshi Nishimura, Masako Matsuzaki, and Katsushi Toshihiro

AIR POLLUTION IN THE IWAKUNI-WAKI AREAS. *(Iwakuni, Waki Chiku no taiki osen ni tsuite). Text in Japanese. In: Data on Studies of Air Pollution in Iwakuni (and Waki Village). Yamaguchi Prefectural Research Inst. for Health (Japan) p. 149-152, Dec. 1973.*

The measurements of settling particles and sulfur oxides taken in Iwakuni and Waki between September 1964 and December 1969, the industrial locations, industrial operation conditions, fuel consumption, and meteorological conditions in the area were examined. Settling particles were mainly measured by the British standard deposit gauge at 11 stations in Iwakuni and six stations in Waki, and sulfer dioxide was measured by the lead dioxide method at 18 stations in Iwakuni and six stations in Waki. The average settling particles in 1969 was 7.1 tons and SO2 was 0.45 mg/day/sq cm in Iwakuni, and in Waki these were 5.5 tons and 0.66 mg. The characteristics of pollution in this area are typical of any petrochemical industrial city with relatively high concentrations of SO2 in relation to the amounts of dusts. This is particularly true of Waki village, which is adjacent to the petroleum refining and petrochemical industrial complex. In Iwakuni proper, the areas with high SO2 concentration also had high settling particle levels. In both Iwakuni and Waki, when the area is in the leg of factories with northeast or southeast wind, the level of pollution is high. Seasonally, the level of SO2 concentration is higher between April and September when the wind is predominently northeast or southeast.

45074 **APTIC NO. 64990**

Kitagawa, Yoshio, Masako Matsuzaki, and Keizo Kaneda

AIR POLLUTION IN WAKI VILLAGE, KUGA COUNTY. *(Kuga-gun Waki-mura no taiki osen ni tsuite). Text in Japanese. In: Data on Studies of Air Pollution in Iwakuni (and Waki Village). Yamaguchi Prefectural Research Inst. for Health (Japan), p. 22-23, Dec. 1973.*

The state of air pollution in Waki Village was investigated between January and December 1969 by comparing the measurements of sulfur dioxide and settling particles taken at six monitoring stations. The highest yearly average of SO2 was 1.11 mg/sq/km/mo at a kindergarten. At a public meeting house and a middle school the average was 0.71 mg, slightly under the 0.78 mg average of the previous year. The dust quantities were generally small and there were very little geographical differences. The maximum monthly accumulation was 12.76 tons/sq km/mo and monthly averages ranged from 4.60 to 6.26 tins/sq km/mo. The level of SO2 increases between spring and early summer when the wind is predominantly northeast to southeast, and the measurements are especially high in May and June. The levels of dusts is high when winds are northeast to southeast and in April, June and July when the rain level is high.

45075 **APTIC NO. 64997**

Maeda, Morito, Yoshiaki Ogawa, Masashi Yasuda, and Fumimasa Maeno

AIR POLLUTION AND WEATHER IN EAST IWAKUNI. *(Iwakuni shi tobu shigaichi no taiki osen to kisho ni tsuite). Text in Japanese. In: Data on Studies of Air Pollution in Iwakuni (and Waki Village). Yamaguchi Prefectural Research Inst. for Health (Japan), p. 148, Dec. 1973.*

An automatic meter for sulfur dioxide was installed in the Yamaguchi Prefectural Research Inst. for Health. The data of the last 4 mo was studied as a preliminary investigation for establishing soot and smoke control regulations. The measuring location is adjacent to factories utilizing coal furnaces and the average obtained by the Institute s lead dioxide method over the years is 0.64 mg SO3/day/100 sq cm. This average is among the highest in the city. Peaks appeared by the new meter at 2 am in August, at 9 am in September and October, and 10 am in November. Thy highest average for 4 mo was 0.073 ppm at 9 am. The frequency of more than 0.075 ppm concentration occurrences were generally on clear or cloudy days when the temperature was higher than 20 C, in 60-70% humidity; high concentration was very infrequent in rain and when the humidity was more than 90% or less than 50%. High concentration was most frequent in east-northeast winds (40%) and much less (18.5%) when the predominant winds were north-northwest. This area is less polluted than other industrial cities of Yamaguchi Prefecture, but the maximum SO2 measurement was 0.314 ppm for 4 mo, and 0.2 ppm was exceeded 11 times.

45076 **APTIC NO. 64998**

Maeda, Morito, Yoshio Okazaki, Masashi Yasuda, and Norio Maeno

MEASUREMENT RECORDS OF SULFUR DIOXIDE IN THE IWAKUNI AREA BY AN AUTOMATIC METER AND THE WEATHER IN THE AREA. REPORT II. *(Iwakuni chiku ni okeru SO2 jido sokutei sochi ni yoru kiroku to kisho ni tsuite). Text in Japanese. In: Data on Studies of Air Pollution in Iwakuni (and Waki Village). Yamaguchi Prefectural Research Inst. for Health (Japan), p. 132-136, Dec. 1973.*

Data from sulfur dioxide measurements in Iwakuni taken by the lead dioxide method and by an automatic meter from December 1966 to November 1967 are reviewed. The location for automatic measuring was the seventh floor of the city hall, which is flanked by a hill on the west and 1300 m to the east by a complex of factories along the coast. This area, as well as the location of the Research Inst. for Health where the PbO2 method was utilized is highly polluted in the city. The frequency of days with more than 0.05 ppm SO2 concentration was highest on cloudy days with 65-75% humidity and lowest on rainy days. Of cloudy days, 69% had northwest to east-northeast winds. Of hours with wind directions of northwest and east-northeast, 75% had more than 0.05 ppm of SO2; 59% of wind directions throughout the year were northwest or east-northeast, and the city is in position to receive pollutants from those directions. Among the eposides when SO2 concentrations exceeded 0.05 ppm, 51% occurred when the wind velocity was 2-4 m/sec. High SO2 concentrations of more than 0.1 ppm occurred most frequently between 8-10 am when a morning breeze blew from the coastal area and immediately after the factories began their daily operations. Both automatic and PbO2 measurements showed high concentrations between March and June.

45077 **APTIC NO. 65144**

Miyahara, Atsuo, Nobuo Fujimura, Hiroshi Matsumura, Masako Matsuzaki, Katsushi Yamamoto, and Keisuke Nakamura

STUDIES ON AIR POLLUTION IN IWAKUNI AND WAKI AREA. *(Iwakuni, Waki chiku no taiki osen ni tsuite). Text in Japanese. In: Data on Studies of Air Pollution in Iwakuni (and Waki Village). Yamaguchi Prefectural Research Inst. for Health (Japan), and Tokuyama Health Center (Japan), p. 83-98, Dec. 1973. 10 refs.*

Settling particles (measured by the British standard deposit gauge) and sulfur dioxide measured (by DSIR lead peroxide candles) between April 1965 and March 1966 in Iwakuni and Waki Village were studied. The city s coastal line on the Inland Sea runs from northeast, east, to south, and the northern section is contiguous to Waki village and further extends to Otake, Hiroshima Prefecture. Northwest, west and southwest areas are flanked by hills from 200 to 400 m high. All the major factories are along the coast, including thy petrochemical factory in the Waki area, the petroleum refinery at the harbor, the pulp and chemical textile factories in the Marifu area, and the chemical, textile, and thermal power plant in the south and are considered the main pollution sources. Waki is a narrow strip running from the western hills to the eastern coastal industrial area with a population of 7000. In Iwakuni the highest pollution was found in the section adjacent to the factory areas, and localized high pollution was found in the southwest. The annual average of SO2 in 1966 was 0.35-0.77 mg/SO3/day/100 sq cm and the total average was 0.51 mg and was slightly over the 0.47 mg of 1965. The average settling particulates in 1966 ranged from 4.56-9.25 tons. The total average was 6.82 tons and was less than the 7.28 tons of 1965. The ratio of nonsolubles was 5.4%. High SO2 concentration was prevalent from early spring to early fall, and was lower in winter.

45078 **APTIC NO. 65714**

Nenquin, Guy

THE PARTICIPATION OF INIEX IN POLLUTION CONTROL IN THE HAINAUT INDUSTRIAL REGION. *(Participation de l INIEX au controle de la pollution dans les regions industrielles du Hainaut). Text in French. Ann. Mines Belg., no. 10:1137-1140, Oct. 1973.*

A new device, superior to those used in France, Germany, and Great Britain, utilized for collection of dusts in the environment of industrial sites in the Hainaut region, is described. It consists of a gauge, composed of a 25-liter reservoir, surmounted by a 29-centimeter diameter funnel, which collects the dust fall which has washed out pollutant gases from the atmosphere. These appliances are placed around the source of pollution at a maximum distance of 5 km, preferably on the axis of dominant winds from southwest and northeast in the geographical zone where the emanations occur. Eighty gauges are disposed in the Charleroi, Mons, Tournai, and Rebecq Quenast regions. The pollution level in g/sq m/day and the nature of the pollutants are established. Investigations conducted in the environment of thy iron metallurgical plants and cement plants located at, respectively, Charleroi Dampremy and Mons Obourg, indicate that the average annual pollution level at 1.5 km from the works, is of 1 g/sq m/day. The pollution level at the distance of 1 km from the metallurgical plants is much more important than the one in the vicinity of the cement plants. The insoluble dusts from Charleroi Dampremy contain a great quantity of iron, approximately 32% by weight, while the combustible and separable substances (under 900 C) consist of silica; aluminum silicates; and metals such as calcium, soluble silica, aluminum, magnesium, manganese, and chromium. The insoluble dusts collected at Mons contain 40 to 48% combustible and decomposable substances under 900 C; 30 to 38% aluminum silicates; 3.8 to 7.5% iron; as well as calcum, aluminum, silica, manganese, and chromium.

45079 **APTIC NO. 64999**

Nose, Yoshikatsu

THE PRESENT STATE OF AIR POLLUTION AND PROBLEMS IN IWAKUNI CITY. *(Iwakuni-shi no taiki osen no genjo to mondaiten). Text in Japanese. In: Data on Studies of Air Pollution in Iwakuni (and Waki Village). Yamaguchi Prefectural Research Inst. for Health (Japan), p. 99-112, Dec. 1973.*

The measurements of settling particles and sulfur dioxide taken at 13 locations in Iwakuni between September 1964 and August 1967 by the Yamaguchi Prefectional Research Inst. for Health were used to analyze pollution conditions in the city in relation to industrial operation, fuel consumption, and meteorological conditions. As a whole, the amount of settling particles decreased over the 3 yrs from 6.8 to 6.5 tons/sq km/mo, but in some parts of the central and southern factory areas, the averages increased from 116 to 119%. The concentration of SO2 shows a tendency to decrease in the northern and central industrial areas, but in the central commercial and southern industrial areas, it increased from 107 to 134%, and the total average for the city increased from 0.53 to 0.55 mg/100 sq cm. The presence of major factory areas in two or three segments of a large city can change the pollution conditions of the city when there is fluctuation in fuel consumption. Depending on the wind direction, the decrease of fuel consumption in some cities decreased the total air pollution as in the cases of Tokuyama and Nanyo, but in Iwakuni, this had an adverse effect. This might serve as an important consideration in future city planning.

45080 **APTIC NO. 65000**

Nose, Yoshikatsu

THE PRESENT STATE OF AIR POLLUTION AND PROBLEMS IN IWAKUNI CITY. *(Iwakuni-shi no taiki osen no genjo to mondaiten). Text in Japanese. In: Data on Studies of Air Pollution in Iwakuni (and Waki Village). Yamaguchi Prefectural Research Inst. for Health (Japan), p. 65-81, Dec. 1973.*

Settling particles measured at 13 monitoring stations in Iwakuni between April 1965 and March 1966 averaged 7.9 tons/sq km/month, and sulfur dioxide concentration was 0.48 mg SO3/100 sq cm/day. These pollutant averages are generally lower than those of other industrial cities in Yamaguchi Prefecture. But while consumption of coal is decreasing gradually, the consumption of oil is increasing every month, and the amount of settling particles is also increasing every month. These dusts contain a large amount of nonsoluble ash. The concentration of SO2 shows a parallel tendency to decrease with coal consumption because most of the monitoring stations in the city are located leeward of the coal consuming factories. Therfore this does not mean that the total SO2 emission in the city is decreasing. The SO2 of the city is basically increasing together with the consumption of fuel oil.

45081 **APTIC NO. 64996**

Ogawa, Yoshiaki, Masashi Yasuda, and Fumimasa Maeno

AIR POLLUTION AND WEATHER OF THE IWAKUNI AREA. *(Iwakuni chiku no taiki osen to kisho ni tsuite). Text in Japanese. In: Data on Studies of Air Pollution in Iwakuni (and Waki Village). Yamaguchi Prefectural Research Inst. for Health, p. 113-131, Dec. 1973.*

Sulfur dioxide measurements taken continuously and automatically in Iwakuni between August 1 and November 30, 1966 for 2928 hours were examined in the light of meteorological observations during the same period. Hourly measurements showed peaks between 8 and 10 am for the 4-mo period. The frequency of concentration above 0.075 pm SO2 was higher with higher temperature, with 32.4% being above 30 C. But the daily fluctuation patterns showed high concentration when the temperature was increasing, and at the peak of temperature the concentration tended to decline and continued to decrease with the decrease of temperature. The influence of wind direction was most clearly manifested. The highest concentration occurred 40.4% of the time during east-northeast winds. The next highest frequency occurred during northeast, north-northeast, and east winds, in that order. No high concentration appeared in west-southwest wind, south-southwest, southwest and west winds. The relationship between high concentration and the wind velocity was such that 14.3% occurred when the wind was 2-3 m/sec. The average pollution in Iwakuni is 0.045 ppm, and is not as high as in the other areas. The maximum measurement was 0.315 ppm.

45082 **APTIC NO. 64989**

Yamaguchi Prefectural Research Inst. for Health (Japan)

AIR POLLUTION IN IWAKUNI CITY (REPORT NO. 1). *(Iwakuni shigaichi no taiki osen). Text in Japanese. In: Data on Studies of Air Pollution in Iwakuni (and Waki area). p. 1, Dec. 1973.*

Between October 1964 and March 1965 for 6 mo, sulfur dioxide in the air and settling particles were measured at two sub-industrial areas, three commercial areas, and five residential areas. The SO2 was measured by lead peroxide candles. Settling particles were collected by deposit gauges, and nonsolubles, tar, combustibles, ashes, pH, solubles, sulfuric acid ion, chlorine ion, calcium, and total solid substance were analyzed. The measuring locations were increased by four after June 1965. The SO2 average was 0.5-1.32 mg SO3/day/100 sq cm in the sub- industrial areas, 0.22-0.94 mg in the commercial areas, and 0.23-0.61 mg in the residential areas. The average of the total measurements for 6 mo was 0.54 mg. The settling particles in the sub-industrial areas ranged between 4.59 and 8.89 tons/sq km/month, 2.25-7.73 tons in the commercial areas, and 1.16-6.95 tons in the residential areas. The 6 mo average for the total measurements was 5.15 tons.

45083 **APTIC NO. 64991**

Yamaguchi Prefectural Research Inst. for Health (Japan), and Iwakuni Municipal Government (Japan)

CONCENTRATION OF SULFUR DIOXIDE AT TWO LOCATIONS IN IWAKUNI AND CONCENTRATION OF SUSPENDED PARTICULATES. *(Shinai 2 kasho ni okeru aryusan gasu nodo oyobi fuyu funjin nodo ni tsuite). Text in Japanese. In: Data on Studies of Air Pollution in Iwakuni (and Waki Village). p. 35-40 Dec. 1973.*

Sulfur dioxide gas concentration was measured in an elementary school in the highly polluted harbor area of Iwakuni and in a relatively unpolluted elementary school adjacent to a thermal power plant which is scheduled to start its operation in several months. The SO2 was measured by the pararosaniline method and settling particles were taken by KYS tape air samplers. On the day of survey, the level of SO2 concentration was mostly higher than 0.05 ppm in spite of the rain, and 10 hours out of 24 exceeded 0.1 ppm. Between 1 to 4 pm, the rain had stopped and SO2 dropped to 0.03-0.07 ppm in no wind, but when the wind begins to blow, the level rose to over 0.1 ppm, reaching a maximum of 0.15 ppm at 9 pm. From midnight to 4 am, the level was always over 0.1 ppm. When the wind velocity was greater, SO2 was higher. The average concentration of the day was 0.089 ppm. At a school in the south, on the day of survey, the peak was 0.036 ppm at 7 pm, and the average was 0.014 ppm. A slight increase of dust pollution was noted at 9 am and 2 pm. Changes in this situation after the opening of the thermal plant will require attention.

45084 **APTIC NO. 64992**

Yamaguchi Prefectural Research Inst. for Health (Japan), and Iwakuni Muncipal Government (Japan)

AIR POLLUTION IN IWAKUNI CITY (REPORT NO.3). *(Iwakuni shigaichi no taiki osen ni tsuite). Text in Japanese. In: Data on Studies on Air Pollution in Iwakuni (and Waki Village). p. 5-6, Dec. 1973.*

The sulfur dioxide measurements in 1966 in Iwakuni were taken at 14 locations, and the settling particles measurements were taken at 11 locations. The total average for SO2 were 0.51 mg, slightly higher than the 0.47 mg of the previous year. The highest average was 1.02 mg in September at a junior high school in northern Iwakuni. The highest measurement for settling particles was 13.4 tons/sq km/month at the same school. The thermal power plant in southern Iwakuni began its operation in April. The measurements of SO2 at two monitoring locations within a radius of 1 km were not much higher than the previous year, but at 3 km northwest at an elementary school, the measurement for June to August was 0.79 mg/100 sq cm/day, which was an increase of 150% over the previous year. The The total average of settling particles was 6.8 tons/sq km/mo, compared to 7.3 tons in 1964. The composition of these settling particles is 54% nonsolubles.

45085 **APTIC NO. 64993**

Yamaguchi Prefectural Research Inst. for Health and Iwakuni Municipal Government

AIR POLLUTION IN IWAKUNI CITY (REPORT NO. 4). *(Iwakuni shigaichi ni taiki osen ni tsuite). Text in Japanese. In: Data on Studies on Air Pollution in Iwakuni (and Waki Village). Yamaguchi Prefectural Research Inst. for Health (Japan), p. 8-9, Dec. 1973.*

The 1967 measurements of sulfur dioxide in Iwakuni were taken at 16 locations. In all areas, the measurements increased slightly. As in previous years, pollution in areas adjoining the middle-east to northern industrial belt is much higher than in other areas. The total average was 0.52 mg/100 sq cm/day, with the highest average 1.19 mg at the elementary school in the northern harbor area. Nada Elementary School in south near the thermal power plant had a total average of 0.45 mg for the year, but from spring to summer, some very high individual measurements were found. The total coal consumption for 1966 in Iwakuni was 51,400 tons, for 1967, 23,300 tons. The oil consumption was 644,700 kl in 1966 and 652,300 kl in 1967. For this reason, the major pollutant is SO2 rather than dusts in this area. The total average of settling particles taken at 11 locations was 6.43 tons/sq km/month.

45086 **APTIC NO. 64994**

Yamaguchi Prefectural Research Inst. for Health and Iwakuni Municipal Government

AIR POLLUTION IN IWAKUNI CITY (REPORT NO. 2). *(Iwakuni shigaichi no taiki osen ni tsuite). Text in Japanese. In: Data on Studies of Air Pollution in Iwakuni (Waki Area). Yamaguchi Prefectural Research Inst. for Health (Japan), p. 2-3, Dec. 1973.*

The 1965 sulfur oxide measurements in Iwakuni were taken by lead peroxide candles at 13 monitoring locations. Measurements for settling particles were taken by deposit gauges at all locations. The year s average for SO2 ranged from 0.11 to 1.18 mg/day/100 sq cm, with a total average of 0.47 mg. Settling particles ranged between 2.55 to 17.01 tons/sq km/month, with a total average of 7.28 tons. The highest monthly average was 9.94 tons in a northern residential-commercial area. Generally, semi-industrial commercial, and residential areas receiving pollutants from the northern industrial belt were most polluted. The level of SO2 increased slightly in April, May, September, and October. The amount of settling particles increased from spring to summer when the rain precipitation increased.

45087 **APTIC NO. 65143**

Yamaguchi Prefectural Research Inst. for Health (Japan), and Iwakuni Municipal Government (Japan)

AIR POLLUTION IN IWAKUNI CITY. (REPORT NO. 5). *(Iwakuni shigaichi no taiki osen ni tsuite). Text in Japanese. In: Data on Studies on Air Pollution in Iwakuni (and Waki Village). p. 12- 15, Dec. 1973.*

The air pollution investigation in Iwakuni between Jan. and Dec. 1968 showed the greatest degree of pollution from the eastern to northern areas of the city contiguous to the shore industrial belt. The amount of sulfur dioxide in most areas has decreased slightly since 1967 (0.51 mg/day/100 sq cm), and the average was 0.47 mg, representing an 8% decrease. But a valley 3-4 km west of the middle and southern industrial areas showed an increase of SO2 concentration. This might be due to the increase of southeastern wind which puts the area in the lee of the thermal power plant in the south, and the northeast wind which puts the area in the lee of the northern petrochemical factories. In the grade school in the valley, especially, the average between March and June was 0.97 mg, with an increase of 13% over the previous year. The highest measurement of the year in the entire city was at this school in June, with 1.01 mg. This localized pollution is affected by topographical and meteorological factors. The fuel oil consumption of the city increased by 8.4% since 1967, mainly in the northern and southern industrial areas. The suspended particulates quantity increased between early spring and early fall Dusts were higher in months with high precipitation: March, July, and September. The highest single monthly measurement was 14.11 tons at an elementary school in the harbor area in the north.

45088 **APTIC NO. 65145**

Yamaguchi Prefecture Research Inst. for Health (Japan) Waki Village Office

AIR POLLUTION IN WAKI VILLAGE, KUGA COUNTY. *(Kuga-gun Waki-mura no taiki osen ni tsuite). Text in Japanese. In: Data on Studies of Air Pollution in Iwakuni (and Waki Village). p. 16-17, Dec. 1973.*

The 1968 air pollutant measurements in Waki were taken between January and December at two old stations, and after August, at three more new stations. The year s maximum measurement for sulfur dioxide was 1.31 mg/day/100 sq cm at Waki Junior High School in April, and the average for the entire year at the two old stations was 0.78 mg. The highest dust measurement for a single month was 8.9 tons/sq km/mo at the same junior high school in July, and the year s average at the two old monitoring stations was 5.3 tons. The amounts of dust increased in June, July, and September when the rain precipitation was greater than in other months.

45089 **APTIC NO. 65146**

Yamaguchi Prefectural Research Inst. for Health (Japan), Waki Village Office

AIR POLLUTION IN WAKI VILLAGE, KUGA COUNTY. *(Kuga-gun Waki mura no taiki osen ni tsuite). Text in Japanese. In: Data on Studies on Air Pollution in Iwakuni (and Waki Village), p. 10-11, Dec. 1973.*

Pollutant measurements were taken between January and December 1967 in Waki. For sulfur dioxide the average was 0.79 mg/day/100 sq cm with the highest measurement 1.24 mg in June at Waki Junior High School. The year s average for settling particles was 5 tons/sq km/mo with the highest measurement 9.91 tons in June. The SO2 level increased to over 1 mg in May and June. Settling particles increased in March and June, when the rain precipitation quantity was high. The relationship between the quantity of dusts and precipitation were: 9.51 tons and 16.51 l; 7.94 tons and 23.04 l; 9.91 tons and 17.20 l; and 7.70 tons and 19.14 l.

45090 **APTIC NO. 65147**

Yamaguchi Prefecture Research Inst. for Health (Japan), and Iwakuni Municipal Government

AIR POLLUTION IN IWAKUNI CITY (REPORT NO. 7). *(Iwakuni shigaichi no taiki osen ni tsuite). Text in Japanese. In: Data on Studies of Air Pollution in Iwakuni (and Waki Village). p. 23-26, Dec. 1973.*

Measurements of sulfur dioxide and settling particles were taken in Iwakuni between Jan. and Dec. of 1970. The total average of 18 monitoring stations for SO2 was 0.46 mg SO3/day/100 sq cm, compared to 0.45 mg for the previous year. The most polluted area was the same as in the previous year, the harbor school contiguous to the petroleum chemica factories in the northern industrial area, and the average was 0.70 mg. The single highest measurement was 1.10 mg at the Mitsui Petroleum employees residences in July. The total consumption of fuel oil in the entire city has increased by 18.8% and by 22.5% in the northern industrial area; but the SO2 concentration in the north has not increased proportionally. One reason might be that the frequency of north northeast to northeast winds which place the northern districts in the lee was 9.4% in 1970 compared to 13.6% in 1969. The total average of measurements of settling particles at 11 monitoring stations was 7.41 tons/sq km/month, slight increase over the previous year. The most polluted area was a middle school in the northern industrial area with total average of 10.01 tons/sq km/month. The single highest measurement was 25.27 tons in August at a southern primary school. The high measurement was partially due to a typhoon. Generally, both SO2 and dust averages showed higher levels between April and October.

45091 **APTIC NO. 65148**

Yamaguchi Prefectural Research Inst. for Health (Japan), Waki Village Office

AIR POLLUTION IN WAKI VILLAGE, KUGA COUNTY (REPORT NO. 6). *(Kuga-gun Waki Mura no taiki osen ni tsuite). Text in Japanese. In: Data on Studies of Air Pollution in Iwakuni (and Waki Village). p. 27-28, Dec. 1973.*

Measurements were taken at six locations in Waki village in 1970 for settling particles and sulfur dioxide. The total SO2 average was 0.76 mg/100 sq cm/day and showed an increase of 15.2% over the previous year. The most polluted monitoring location was the bank near the petrochemical factory, with an average of 1 mg. Thy highest single measurement was 1.75 mg at the Waki Junior High School. The total average of settling particles was 6.92 tons/sq km/mo, with an increase of 25.4% over the previous year. The highest dust accumulation average was 9.05 tons/sq km/mo in the same bank area, with the highest monthly measurement 23.10 in August. The causes for these increases are increased fuel consumption in the Waki and harbor areas (by 22.5%), and the frequent east-northeast and southeast winds in 1970. More positive control measures for emission sources such as stack gas desulfurization, use of lower sulfur oil, and more complete monitoring systems are required.

45092 **APTIC NO. 65149**

Yamaguchi Prefectural Research Inst. for Health (Japan), Waki Village Office

AIR POLLUTION IN WAKI VILLAGE, KUGA COUNTY. *(Kuga-gun Waki-mura no taiki osen ni tsuite). Text in Japanese. In: Data on Studies on Air Pollution in Iwakuni (and Waki Village), p. 6-7, Dec. 1973.*

The main portion of Waki Village is in the southern basin of the Ose River. At a distance of 1-2 km east to southeast is a petrochemical industrial complex adjoining North Iwakuni and at 2-3 km northeast are the Otake petrochemical, synthetic, and pulp industries. The southwest and northwest are surrounded by hills. The 1966 measurements of settling particles were 9.6 tons/sq km/mo maximum, with an average of 5.7 tons. The sulfur dioxide average for 1966 was 0.71 mg/100 sq cm/day. The average nonsolubles in dusts were 3.02 tons and solubles were 2.66 tons. The highest monthly average of SO2 was 1.02 mg in May, followed by 0.95 in June, and 0.92 in August. The measurements are low in winter for both SO2 and dusts.

45093 **APTIC NO. 65171**

Tokyo Electric Power Co., Inc.

RESULTS OF THE CONCENTRATION OF NITROUS OXIDES MEASURED IN VARIOUS AREAS. *(Chisso sankabutsu nodo-to no koiki sokutei kekka ni tsuite). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 15:50-67, Feb. 1973.*

According to results obtained in three highly urban areas such as Tokyo and Kanagawa and Chiba Prefectures, the concentration of nitric oxide and carbon monoxide varies in accordance with traffic volume, and both of them share a close correlation. Nitrogen oxides were in the range of 0.01-0.3 ppm, and high NOx concentration was restricted to roadsides and intersections of heavy traffic volume in which NO concentration was higher than that of nitrogen dioxide, which can probably be attributed to a high ratio of NO to NO2 in automobile exhaust fumes. Air pollution stemming from sulfur dioxide was worse in the order of Tokyo, Kanagawa, and Chiba Prefectures, as was the case for NOx. High SO2 concentrations were measured in the Tokyo area, which is not affected by industrial sources. Carbon monoxide concentration, as in the case of NO, varied depending upon traffic volume, which indicates both CO and NO derive from the same pollution source. In an effort to examine effects of automobile exhaust on air pollution, the Koshu highway was studied, and distribution of air pollution at several spots situated on a horizontal level with the highway, as well as diffusion of air pollution in the vertical direction, were studied. As a result, a remarkable pollution distribution was observed in adjacent spots to the highway, while concentration of NO2, CO, and NOx decreased with altitude.

45094 **APTIC NO. 65678**

Bureau of Environmental Control, Yokohama Municipal Office, and Bureau of Environmental Control, Kawasaki Municipal Office

AIR POLLUTION IN KEIHIN INDUSTRIAL ZONE. *(Keihin kogyo chitai no taiki osen). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama, Kawasaki Ind. Area), no. 15:7-24, Feb. 1973.*

For the purpose of monitoring the real situation in the Keihin Industrial district so that data on anti-air pollution measures can be made available, Yokohama has used the deposit gauge method and lead dioxide method to measure falling dust and sulfur oxides since 1957, while Kawasaki has adopted these methods since 1957, but has switched from the deposit gauge method to the Dust Jar since 1971. Spots where monitoring equipments are set up are listed. The maximum concentration of falling dust in a monthly average value measured during one year was 18.7 tons/sq km/month in Yokohama and 30.86 tons/sq km/month in the industrial areas of Kawasaki, while the minimum of sulfur oxides was 3.9 tons/sq km/month in rural areas of Yokohama and 5.3 tons/sq km/month in rural areas of Kawasaki. The concentrations of sulfur oxides were measured in 44 spots including 32 spots in Yokohama and 12 spots in Kawasaki. The maximum concentration in the monthly average value of sulfur trioxide measured during one year was 2.10 mg/100 sq cm/day in industrial areas of Yokohama and 4.26 mg/100 sq cm/day in industrial areas of Kawasaki, while the minimum was 0.11 mg/100 sq cm/day in rural areas of Yokohama and 0.62 mg/100 sq cm/day in commercial and residential areas of Kawasaki. In terms of annual average of SO3, it was 0.30 mg/100 sq cm/day in industrial areas of Yokohama, 0.92 mg/100 sq cm/day in sub-industrial areas, 0.65 mg/100 sq cm/day in commercial and residential areas and 0.30 mg/100 sq cm/day in rural areas, while in Kawasaki it was 3.27 mg/100 sq cm/day in the industrial areas, 3.08 mg/100 sq cm/day in the sub-industrial areas, 1.45 mg/100 sq cm/day in the commercial and residential areas, and 0.68 mg/100 sq cm/day in the rural areas.

1972

45095 **APTIC NO. 65612**

Shimonoseki Municipal Government (Japan)

PUBLIC NUISANCES IN SHIMONOSEKI CITY, 1972. *(Shimonoseki-shi no kogai). Text in Japanese. 174p., March 1972.*

Shimonoseki faces a channel and seas on three sides and is flanked by low hills of 70-250 m in height and consequently the wind direction fluctuates quite frequently, but the temperature is relatively stable. The wind is strong from winter to spring and the number of stormy days is considerable. For these reasons, pollution conditions are not sustained for many hours. Air monitoring was started in 1969 with 10 deposit gauges for settling particles (increased to 12 in 1970), one automatic sulfur oxide meter, one suspended particulate meter, and 15 SOx gauges. In 1971, one automatic meter and 13 SOx gauges were added. Presently, a telemetry system with 7 monitoring stations is under construction. The annual average of settling particles at 12 locations was 7.91 in 1971 compared to 11.12 tons/sq km/mo in 1970. The maximum measurement was 16.06 tons in August and 4.75 tons in September. The SOx measurement decreased from 0.041 to 0.03 ppm in 1971; in one industrial area, the level increased from 0.022 ppm to 0.025 ppm. The concentration tends to be high in the eastern and southern industrial areas. High concentration alerts were issued 15 times in 1970 and only five times in 1971. Generally, the air quality in Shimonoseki passes the standards in all categories. Citizen complaints against pollution are checked by a 50-member staff. The total number of complaints registered so far is 29, mostly against bad odor.

1971

45096 **APTIC NO. 65485**

Bouquiaux, J., J. Grandjean, and M. Legrand

AIR POLLUTION DUE TO SULFUR OXIDES AND SMOKE IN THE LIEGE, CHARLEROI AND ANTWERP URBAN AGGLOMERATIONS DURING THE APRIL 1, 1968-MARCH 31, 1969 PERIOD. *(La pollution atmospherique par les oxydes de soufre et la fumee dans les agglomerations de Liege, Charleroi et Anvers au cours de la periode du 1er avril 1968 au 31 mars 1969). Text in French and Swedish. Royal Meteorological Institue of Belgium, Brussels, Series A, Rept. 74, 45p., 1971.*

Systematic measurements of the black smoke and sulfur oxides (acidity) concentrations in the air in the Liege, Charleroi, and Antwerp urban agglomerations, conducted in the period from April 1, 1968 through March 31, 1969, are described. Air was sampled with a diaphragm pump at a rate of about 2 cu m/hr through Whatman No. 1 filter paper for the retention of particulate matter, and further through a bubbler containing 0.3% hydrogen peroxide for the retention and conversion of sulfur oxides. The dust retained on the filter paper was determined by the reflectometric method. Monthly average sulfur dioxide and black smoke concentrations are given separately for the summer and winter periods, along with the respective frequencies at which 100, 150, 300, 500, 750, 1000, and 1500 micrograms/cu m concentrations were reached or exceeded.

ATMOSPHERIC INTERACTION

1974

45097 **APTIC NO. 65701**

Anderson, L. B. and J. W. Meyer

HIGH-ALTITUDE JET PLUME CHEMISTRY. *Acta Astronaut., 1(3-4):541- 555, March-April 1974. 25 refs.*

Chemical modeling results for exhaust jets of high-altitude supersonic aircraft are summarized. Emphasis is placed on reactions involving species with a potential environmental impact. The jet exhaust can be divided into two flow regions each having distinct chemical features. The first is an isothermal core region which extends many nozzle diameters downstream from the engine exit. Chemical kinetic modeling of this region yields concentrations of reactive atoms and radicals such as H. O, OH, and HO2, which are many orders of magnitude greater than their local equilibrium values. Net rates of atom and radical recombination are slow, and the chemistry of species such as nitrogen oxides and sulfur oxides is dominated by steady-state mechanisms controlled by the radical concentrations. The second flow regime is one of rapid turbulent mixing between the engine exhaust and the surrounding air flow, which quickly quenches many of the chemical reactions. Recombination of H, O, HO2, and OH then occurs within a time scale of tens of milliseconds. However, the model results show that if the core region radical concentrations are comparable to NOX concentrations, as is the case with afterburning, appreciable NOX may be converted to nitrous acid. Conversion to nitric acid might be more important from an environmental viewpoint. Partial conversion of NOX to HNO3 takes place only when significant quanities of unburned hydrocarbons are present in the plume. Emitted sulfur and odd nitrogen species will enter the stratosphere as sulfur dioxide, nitric oxide, nitrogen dioxide, and nitrous oxide from the jet plume. A potential effect is that NOx from the engine exhausts may reduce the ambient concentration of stratospheric ozone which absorbs harmful ultraviolet radiation, thus causing increased ultraviolet radiation to reach the earth. (Author abstrract modified)

45098 **APTIC NO. 65418**

Castleman, A. W., Jr., H. R. Munkelwitz, and B. Manowitz

ISOTOPIC STUDIES OF THE SULFUR COMPONENT OF THE STRATOSPHERIC AEROSOL LAYER. *Preprint, 37p., 1974 (?). 38 refs. (Presented at the International Symposium on Atmospheric Trace Gases, Mainz, Germany, April 2-6, 1973.)*

The sulfur concentration and isotopic ratio of particles collected from 1962 to 1971 in the lower stratosphere over a wide range of latitudes were investigated to obtain direct evidence concerning the importance of various contributing S sources, as well as the significance of in situ gas-to-particle reactions. The major perturbations to the low level persistent aerosol layer result from a few explosive volcanic eruptions. The extent of the initial tephra contribution to the layer gradually subsides, but particles are continuously replenished by aerosols formed from the gaseous portion of the eruptions. Trends in delta S34 enrichment following an event are consistent with a simple one-dimensional model accounting for both transport and chemical reactions. During periods of comparative volcanic quiescence, the isotopic ratios of stratospheric sulfates in both hemispheres exhibit a similar value, suggesting continual input from a common equatorial sources. (Author abstract modified)

45099 **APTIC NO. 68058**

Cleveland, W. S., T. E. Graedel, B. Kleiner, and J. L. Warner

SUNDAY AND WORKDAY VARIATIONS IN PHOTOCHEMICAL AIR POLLUTANTS IN NEW JERSEY AND NEW YORK. *Science, 186(4):1037-1038, Dec. 13, 1974. 6 refs.*

Concentration distributions of air contaminants and meteorological variables in New Jersey and New York for workdays and Sundays are compared by means of quantile-quantile (Q-Q) plots. The Sunday quantiles of nitric oxide, nitrogen dioxide, carbon monoxide, nonmethane hydrocarbons, aerosols, and total hydrocarbons were markedly lower than the workday quantiles, since on the Q-Q plots all these points are well below the line Y equals X. The quantiles for aldehydes and methane are slightly lower on Sundays than on workdays, whereas sulfur dioxide showed no consistent pattern. The ozone maxima are only lightly higher on Sundays, where O3 averages are markedly higher. For all the meteorological variables the workday and Sunday quantiles are quite similar except for solar radiation, mixing height, and vertical sigma which have noticeably higher Sunday quantiles. (Author abstract modified)

45100 **APTIC NO. 65255**

Crow, Loren W.

COLLECTION AND ANALYSIS OF METEOROLOGICAL DATA FOR ENVIRONMENTAL IMPACT ASSESSMENT AT REMOTE SITES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 18p., 1974. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-125.)*

The collection and analysis of meteorological data for environmental impact assessment at remote sites are discussed. The dispersion of effluents from any planned industrial site is almost totally dependent on the ambient air motion and a coincident stability of that air. The set of meteorological data being collected at and near a remote plant site must be treated to simulate the air motion at effective stack heights for all weather conditions and for distances from the plant site over which detectable quantities of effluent may eventually be measured. Extrapolation from surface wind data or from vertical soundings made at airport weather stations several miles away from the plant site can easily produce erroneous information. The local influences of surrounding terrain produce unique downslope and upslope airflow patterns. Presence or absence of solar radiation over surrounding terrain can cause airflow to nearly reverse itself as stability changes from stable to unstable. Steady state conditions are the exception rather than the rule. Source data were collected in field study areas primarily in the states of Wyoming, Colorado, and New Mexico. (Author abstract modified)

45101 **APTIC NO. 65254**

Habegger, Loren J. and Thomas D. Wolsko

ESTIMATION OF ANNUAL 1-HOUR AND 8-HOUR MAXIMUM AIR POLLUTANT CONCENTRATION NEAR HIGHWAYS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1974. 9 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-123.)*

Graphical procedures for simple hand calculation of the air quality impact of highways in regions up to 500 ft from the highway edge are presented. A direct comparison with National Ambient Air Quality Standards for carbon monoxide is possible. The graphical procedures are compiled from a Gaussian diffusion model which has been validated using 230 receptor hours of CO data obtained from downwind and upwind measurements in the vicinity of both at-grade and depressed highways. The computational model assumes uniform concentration in the vehicle induced turbulent mixing cell over the highway and Gaussian dispersion, using Pasquill-Gifford dispersion coefficients, in the downwind plume that emerges with finite inital dimensions from the downwind side of the turbulent mixing cell. Curves for 1-hour maximum impacts are based on a 2 mph wind spped and wind angles which maximize concentrations. Values for 8-hour maxima are compiled from the Gaussian model with wind parameters based on a 5-year statistical analysis of fluctuations in wind spped and direction during 8-hour periods in which the average wind speed was less than 5 mph. (Author abstract modified)

45102 **APTIC NO. 65549**

Hoot, Thomas G. and Robert N. Meroney

THE BEHAVIOR OF NEGATIVELY BUOYANT STACK GASES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1974. 16 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-210.)*

Mathematical expressions for dense gas plume dynamics and concentration behavior are summarized. Plume dynamic behavior was observed and measured in wind tunnel tests by use of titanium tetrachloride smoke. Concentrations were measured by the use of Krypton-85 as a tracer gas. Dense gas emissions were formed by mixing air and freon in varying proportions to form gas of the desired specific gravities. Experimental measurements were made of plume rise height for vertical plumes in a quiescent medium and for bent over plumes in a laminar crosswind. The horizontal touchdown distance was also measured for the bent over plumes in a laminar crosswind and for dense gas ground sources in a turbulent boundary layer under neutral and inversion stratifications. Experimental results were correlated with parameters developed in the theoretical analysis where appropriate. Expressions were developed for plume rise height and for vertical and bent over plumes and for touchdown distance and concentration behavior for bent over plumes. The effect of specific gravity on dense ground sources is noted from experimental data. (Author abstract modified)

45103 **APTIC NO. 68072**

Ishiguro, Ichiro

STUDIES ON AIR POLLUTION ON AUTOMOBILE HIGHWAYS. *(Jidosha doro no taiki osen ni kansuru kenkyu). Text in Japanese. Kinki Daigaku Kogai Kenkyusho Kenkyu Hokoku (Kinki Univ. Pollut. Res. Inst. Rep.), no. 2:101-109, Oct. 1974. 3 refs.*

For the calculation of air pollution on automobile highways by the known method, the linear or plane continuous pollutant source and diffusion by wind in the crossing direction are assumed. In the case of zero wind velocity in the crossing direction, however, the pollutant concentration is indicated as infinity. To eliminate such shortcomings, the concept of the equally spaced pollutant source model was developed, equations for calculating pollutant concentrations in the vicinity of automobile highways were derived, and calculations were made. The uniqueness of the model of this study is that two diffusion steps, the diffusion due to the wind stirred by moving automobiles and the diffusion by natural wind, are considered. The actual pollutant concentrations on automobile highways were measured and the validity of these equations at zero wind velocity in the crossing direction was examined.

45104 **APTIC NO. 68130**

Konishi, Shigeki, Ichiro Saino, and Masakichi Nishimura

DETERMINATION OF MERCURY IN THE ATMOSPHERE AND PRECIPITATION. *(Taiki oyobi kosuichu no suigin no teiryo). Text in Japanese. Preprint, Geochemical Society of Japan, p. 66-67, 1974. (Presented at the Geochemical Society of Japan Study Meeting, Tokyo, Japan, Oct. 1-3, 1974.)*

For the purpose of investigating the land-air-sea circulation of mercury, methods with high sensitivity and accuracy for analysis Hg concentration in atmosphere and precipitation were developed. The atmospheric Hg sample was reduced to metallic Hg by passing the air sample through an aqueous solution containing stannous chloride and concentrated sulfuric acid and adsorbed on porous silver grains. The Hg sample adsorbed on Ag grain was heated at 500 C for 4 min and determined by atomic absorption spectrometry. Decreases in Hg concentration in precipitation samples during storage was prevented by adding potassium permanganate solution and concentrated H_2SO_4. After adding hydroxylamine hydrochloride solution, the Hg compounds in samples were reduced by adding $SnCl_2$ solution and concentrated H_2SO_4, vaporized by bubbling with nitrogen gas, adsorbed on porous Ag grains, heated at 500 C and analyzed by atomic absorption spectrometry. The Hg concentration measured by the reduction adsorption method was higher than that of the direct absorption method, indicating the higher collecting efficiency of the reduction method. The data on Hg concentration in atmosphere and precipitation are given. The Hg concentration in precipitation is one order higher than that in sea water.

45105 **APTIC NO. 65569**

Lyons, Walter A. and Henry S. Cole

THE USE OF MONITORING NETWORK AND ERTS-1 DATA TO STUDY INTERREGIONAL POLLUTION TRANSPORT OF OZONE IN THE GARY-CHICAGO-

MILWAUKEE CORRIDOR. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 25p., 1974. 16 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-241.)*

Environmental Protection Agency monitoring of ozone in several cities within the Great Lakes area is presented. Regions within approximately 20 km of the Great Lakes have greatly increased pollution potentials due to the various micrometeorological conditions produced by the cold water of those lakes. Limited ozone monitoring conducted by EPA in Milwaukee in 1971 revealed surprisingly high values. In 1973, the Wisconsin Department of Natural Resources began installation of nine air quality monitoring stations in southeast Wisconsin, and one in rural Poynette. The southeastern sites again revealed high values, two or more sites exceeding 8 pphm on 27 days over a 47-day period, with alert levels (40 pphm/hr) being reached nine times. Peak values between 20-30 pphm were recorded several times, especially at Racine, Wisconsin. Poynette also frequently exceeded 8 pphm. The winds were from the southwest through east-southeast fully 92% of the days exceeding the primary oxidant standard. Ozone levels are comparatively low within 1 km of the shoreline and reach their highest values 1-4 km inland. A mechanism is proposed which illustrated how the complex wind and thermal structures in lake breezes could lead to continuous fumigation of stored oxidants to the surface in a narrow band parallel to the shore. An ERTS image of the Lake Michigan area strongly supports a theory that much of the pollution originates in the Chicago-Gary area and is transported northwards in the lake breeze convergence zone.

45106 **APTIC NO. 68078**

Manton, M. J.

CONVECTION IN THE LOWER ATMOSPHERE. *Aust. J. Phys., 27(4):495- 509, Aug. 1974. 12 refs.*

A model of a typical convection cell involved in the vertical transport of heat from a thin well-mixed layer near the ground to the ambient air up to a strong inversion of about 1 km above the ground is developed. The model is simplified by the inclusion of only those physical processes which play a dominant role. An axisymmetric cell of constant radius is considered. The fundamental property of the model convection cell is that its horizontal extent is small compared with its height. The convection cell model, i.e., a plume and its associated downdraft, appears to be consistent with observations in the atmosphere and indicates that more complicated models are not required to explain some of the basic features of the convection process.

45107 **APTIC NO. 65744**

Moore, D. J.

THE PREDICTION OF THE MEAN HOURLY AVERAGE MAXIMUM GROUND LEVEL CONCENTRATION OF SULPHUR DIOXIDE AT TILBURY. *Atmos. Environ., 8(6):543-554, June 1974. 7 refs*

Measurements of the maximum hourly average concentration of sulfur dioxide at Tilbury, grouped according to wind speed and vertical temperature profile, are compared with values calculated from an expression developed by Moore. The expression can be used to predict Tilbury concentrations without change in the parameters derived from Northfleet data. The expression still applies, even in conditions when chimney down-wash has been observed, indicating that the fraction of the plume material involved in down-wash is fairly small. The method of estimating the rate of emission of SO2 for the two power stations, one oil-fired (Tilbury) and one coal-fired (Northfleet) appeared to be satisfactory, with the possible exception of very low loads. The model ignored the variation of plume rise with atmospheric stability at a given wind speed, and attempts to introduce this effect into the model produced a poorer agreement with the data. An appendix presents an abridged version of the Moore dispersion model. (Author abstract modified)

45108 **APTIC NO. 65551**

Nee, Victor W., Albin A. Szewczyk, Kwang-Tzu Yang, Fan B. Cheung, and Vincent K. Liu

THE SIMULATION OF THE ATMOSPHERIC SURFACE LAYER IN THE NOTRE DAME ATMOSPHERIC WIND TUNNEL. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 26p., 1974. 10 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-213.)*

A wind tunnel was designed to simulate the atmospheric surface layer in the laboratory. Arrays of adjustable side jets in a turbulence generation box in front of the test section are used to produce flows with desirable turbulence characteristics. A thick surface layer with a logarithmic profile of 2 ft thickness can be established simultaneously with constant high turbulence intensity and Reynolds stress distributions. The energy decay is significantly small over a 7 m test section. The flow produced in the tunnel possesses favorable features to simulate the neutral wind in studies of air pollution and wind loading. (Author abstract modified)

45109 **APTIC NO. 65679**

Peukert, Volkmar

STUDY OF THE INFLUENCE OF ATMOSPHERIC POLLUTANTS ON THE WATER COMPOSITION OF WATER BODIES. *(Untersuchungen des Einflusses atmosphaerischer Verunreinigungen auf die Wasserbeschaffenheit der Gewaesser). Text in German. Wasserwirt.-Wassertech., 24(5):158-161, 1974. 11 refs.*

Examinations of the water in brooks in the Erzgebirge flowing through a spruce forest entirely unpopulated revealed extremely low pH values between 3.9 and 5.5. The arithmetic mean of 62 samples yielded a pH of 4.7 which is lethal for all fish and most microorganisms, which explained the absence of trout, formerly so abundant in these waters. Measurements of the pH in precipitations such as rain and snow yielded extremely low values. The sulfur dioxide concentration of the atmosphere was revealed as the cause. This gas, emitted primarily by industry, is dissolved in water and forms sulfuric acid. The extremely high sulfate concentrations measured in precipitations support this. In the vicinity of urban areas sulfate concentrations as high as 700 mg/l were measured. In remote, hardly industrialized areas concentrations of up to 200 mg/l were measured. Generally, the concentration was found to fluctuate between 10 and 70 mg/l. The arithmetic mean of 218 measurements was 41 mg/l. The sulfate values of snow with 10 mg/l were clearly below those of rain. The concentrations of cadmium, manganese, iron, copper, zinc, cobalt, silver, and lead, which were also measured in the precipitations, were below the toxic limits. At times the phosphate concentration in the examined brooks far ahead of any entry of wastewater rose to 23 mg/sq m. In this case, the amounts came from atmospheric washout with the rain. This explains the extensive algae growth at times in the drinking water reservoirs.

45110 **APTIC NO. 68107**

Ronneau, C., J. Cara, and D. Apers

GASEOUS POLLUTANT DISPERSION STUDY BY MEANS OF GASEOUS TRACERS. *(Dispersion de gaz polluants etudiee par traceur gazeux). Text in French. Ind. Chim. Belge, 39(9):757-760, Sept. 1974. 3 refs.*

The dispersion of gaseous pollutants was studied by means of sulfur hexafluoride as a tracer, using activated carbon for absorption for subsequent desorption by heating. The limit of detection may be as low as 0.0001 ppm. Dispersion studies with sulfur hexafluoride emitted from a single punctiform source in instable air at wind speeds ranging from 3 to 15 m/sec revealed a large amplitude and high frequency of fluctuation in the tracer concentrations with time at distances between 1 and 5 km from the emission source. The fluctuation of the cumulative concentration as the sum of concentrations measured at different heights at the same distance simultaneously was less pronounced than that of the individual concentrations. The duration of the concentration maxima both varied greatly and increased with the distance from the source.

45111 **APTIC NO. 65550**

Schon, J. P., C. Rey, and J. Mathieu

EXPERIMENTAL STUDY OF UNSTABLE STRATIFIED BOUNDARY LAYERS COMPARISON WITH THE STRUCTURE OF THE ATMOSPHERIC SURFACE LAYER. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 26p., 1974. 26 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-212.)*

Measurements of turbulent characteristics of unstable stratified boundary layers were made in the range of Monin Obukhov length from - infinity to - infinity 3 m and compared to the KANSAS experiments. There was good agreement between a wind tunnel and the atmosphere for mean and fluctuating quantities. The spectra obtained in the wind tunnel show some differences with atmospheric ones due to the influence of the Reynolds number. In spite of the large measurement scattering in the atmosphere as well as in the wind tunnel, the ratio of eddy diffusivities, the ratio of horizontal to vertical heat flux, and some third order moments are in acceptable agreement. Suggestions are made to improve the simulation of the atmospheric surface layer. (Author abstract modified)

45112 **APTIC NO. 65552**

Tan-Atichat, Jimmy and Hassan M. Nagib

WIND-TUNNEL SIMULATION OF NEUTRAL ATMOSPHERIC SURFACE LAYERS BY THE COUNTER-JET TECHNIQUE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 24p., 1974. 20 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-3, 1974, Paper 74-214.)*

A new technique to generate thick turbulent boundary layers in relatively short distances and capable of modifying and controlling rapidly the mean and unsteady profiles of the simulated layers is presented. The increased thickness is achieved in the I.I.T. Environmental Wind Tunnel by providing large momentum defects at the wall through upstream-oriented, spanwise-discrete wall jets, with changeable jet velocities and controllable jet angles. Various mean velocity profiles of the boundary layer are obtained at the same streamwise position using different settings of the counter-jet parameters and different types of artificial surface roughness. The transverse uniformity of these layers is also documented. Selected measurements of the flowfield in the vicinity of a building model tested in three surface layers are compared in order to examine the sensitivity of measured effects to changes in the surface layer characteristics. Viewing the flowfield with the aid of the modular flow concept, changes in the wake of the building, in the flow above its roof, and in the shear layer spreading downstream from its top are recorded through profiles of mean velocity and turbulence intensity. The effect of the wind direction with respect to the model is also investigated. (Author abstract)

45113 **APTIC NO. 65705**

Yoshikawa, Akira and Katsuto Yamaguchi

MATHEMATICAL ANALYSIS OF CAVITY FLOW AND INDOOR AIR FLOW. *(Kyabiti furo oyobi shitsunai kiryo no suchi kaiseki). Text in Japanese. Preprint, Japan Society of Heating, Air-Conditioning, and Sanitary Engineers, Tokyo, p. 1-6, 1974. 12 refs. (Presented at the Japan Society for Heating, Air-Conditioning, and Sanitary Engieers, Kansai Branch Scientific Studies Presentation Meeting, Osaka, Japan, March 20, 1974.)*

Prediction of high-concentration local pollution from automotive emissions at intersections and in street canyons, while taking into account the structure and micrometeorology of a city, can greatly prevent more generalized air pollution. Since actual measurements have indicated that the carbon monoxide concentration is highest about 20 m before an intersection, the mathematical analysis discussed deals with a simple street canyon, calling it a two-dimensional cavity flow. Approaches to the determination of local pollution are mathematical calculations, experimental model formulas, wind tunnel experiments, and on-site measurements. Due to the fact that the concentration distribution on and along the street is affected by traffic quantity, weather conditions, and other variables a prediction method has not yet been established. In this mathematical analysis, the concentration and flow rate distributions in the cavity are calculated, using diffusion equations which are solved by mathematical calculations. The same method is applied to indoor air flows.

45114 **APTIC NO. 65739**

Yoshikawa, Akira, Katsuto Yamaguchi, Hitoshi Miyamoto, and Yoshikatsu Igawa

WIND TUNNEL EXPERIMENTS FOR CONCENTRATION OF AUTOMOTIVE EMISSIONS AT INTERSECTION. *(Kosaten ni okeru jidosha haigasu nodo no fudo jikken). Text in Japanese. Preprint, Japan Society of Heating, Air-Conditioning, and Sanitary Engineers, Tokyo, p. 7-12, 1974. 4 refs. (Presented at the Japan Society of Heating, Air- conditioning and Sanitary Engineers, Kansai Branch, Scientific Studies Presentation Meeting, Osaka, Japan, March 20, 1974.)*

Using a simulation model of an intersection in which there are four buildings, A, B, C and D, one at each corner of the intersection, a wind tunnel experiment was performed to find out how much the selected factors would affect the concentration of automotive exhaust gas at the intersection. The factors included width of the road running in the X direction, that of the road running in the Y direction, the wind velocity, the wind direction, and the four buildings mentioned above. Five regions at or about the intersection were selected for measurement of the concentration; the center region, two regions on the X road, and another two on the Y road. The wind velocity distribution was simulated well to that in the atmosphere above an urban area, as was the degree of turbulence distribution. Two sets of these factors were used: one consisting of the building height 100 mm for all the four buildings, the road width 20 mm for the X and Y alike, the wind velocity 5.59 m/sec, and the wind direction 45 deg; the other consisting of the building height 50 mm, the road width 50 mm , the wind velocity 1.51 m/sec and the wind direction zero deg. The effect of the wind velocity accounts for 20-50% of the total effect causing changes of the concentration in each region while effects of the other factors differ according to the individual regions.

45115 **APTIC NO. 68065**

Air Pollution Weather Center, Japan

THE SMOG ON JUNE 12, 1974. *(Showa 49-nen 6-gatsu 12-nichi no sumoggu ni tsuite). Text in Japanese. Fukuoka-Kanku Kisho Kenkyu-Kaishi (Proc. Fukuoka District Meet. Study Meteorol.), no. 35:50-53, Oct. 1974.*

In Kitakyushu, the request for a voluntary 20% reduction in sulfur dioxide emission was issued to all major industries on June 12, 1974. After several days of stagnant weather pattern with the formation of an inversion layer and low wind velocity of less than 3m/sec, the SO2 concentration in the city registered 0.07 ppm. To establish the method for forecasting smog formation based on meteorological data, a case study was conducted. The meteorological data for the preceding several days were compiled and analyzed in terms of pressure pattern, inversion layer, sea breeze front, and land and sea breeze and evaluated in relation to SO2 concentration.

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45116 **APTIC NO. 65281**

Bolin, Bert

RESIDENCE TIME OF SULFUR IN THE ATMOSPHERE AS DEPENDENT ON HEIGHT OF EMISSION, INTENSITY OF TURBULENT TRANSFER AND EFFICIENCY OF SINK MECHANISMS. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 14-15, Aug. 1973. 2 refs. (Complete text not available through APTIC.)*

The transport, diffusion, and chemical reactions of atmospheric aerosols which can simultaneously occur are discussed. Problems of geochemical balances on a regional and global scale have commonly been dealt with using concepts such as residence times or turn over times that roughly express the combined effect of all such processes. In the case of the sulfur budget and anthropogenic emissions of sulfur, the characteristic time for sulfur in the atmosphere is on the order of days. Therefore, regional inhomogeneities exist and dispersion is more important. Since the sink process is partly due to rain-out and wash-out of sulfate in aerosols and partly due to dry deposition of particulate sulfur and sulfur dioxide, transfer mechanisms both vertically and horizontally must be considered. These processes are described quantitatively, the way they contribute to determining sulfur residence times is discussed, and the deposition patterns dependent on basic meteorology and the characteristic features of the earth s surface are described. The relative importance of the various atmospheric processes are discussed under the circumstances of roughness characteristics of the underlying surface, intensity of the horizontal wind and turbulence intensity, stratification of the atmospheric boundary layer, average height of anthropogenic emissions, and efficiency of rain-out and wash-out mechanism for the determination of the residence time of a pollutant in the atmosphere, particularly sulfur. (Author abstract modified)

45117 **APTIC NO. 65295**

Castleman, A. W., Jr.

ISOTOPIC STUDIES OF THE SULFUR COMPONENT OF THE STRATOSPHERIC AEROSOL LAYER. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 51, Aug. 1973. (Complete text not available through APTIC.)*

An investigation of the sulfur(32)/S(34) isotopic ratio of the S component of stratospheric aerosols was completed. The isotopic ratio tracer technique was used. The relative importance of major sulfur sources responsible for the formation and persistence of the Junge aerosol layer was determined. A large fraction of this layer was comprised of sulfur-bearing compounds, and this caused concern that industrial sulfur emissions may lead to an increasing stratospheric aerosol concentration which would alter the earth s albedo. In the absence of major volcanic eruptions, the S(34) enrichment of stratospheric aerosols averaged about + 2.5 0/00. Measurements made for tropospheric aerosols showed these to have enrichment values ranging from + 4 to +5 0/00, while those of marine origin had values of + 15 to + 20 0/00. Using these values and those measured for sulfates collected in upwelling air masses and for gaseous sulfur compounds sampled above haze layers, an approximate material balance was developed for S in the upper atmosphere. The major continuous source for S in the stratosphere was from tropical upwellings rather than from eddy diffusion through the global tropopause. Primary perturbations to the layer resulted from certain major volcanic eruptions, namely those of Mt. Agung, Trident, Surtsey, Mt. Redoubt, and Fernandina. (Author abstract)

45118 **APTIC NO. 65284**

Chamberlain, A. C.

DEPOSITION OF SO2 BY GASEOUS DIFFUSION. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 25-27, Aug. 1973. 30 refs. (Complete text not available through APTIC.)*

Previous work on the dry deposition of sulfur dioxide by vegetation is briefly reviewed. Theoretically, an analogy exists between deposition of a vapor and transpiration of water. The resistance is the sum of components due to different parts of the boundary layer. Present work uses two methods: using 35SO2 vapor, and measuring the lateral gradient of SO2 with height above ground. Both experimental and theoretical results suggest that resistance is probably of the order of 2 sec/cm, though it may be less than this under certain circumstances. Monitoring the total flux of sulfur from atmosphere to ground revealed that about 40% is dry deposition in country areas and 80% in towns. (Author abstract modified)

45119 **APTIC NO. 65386**

Changnon, Stanley A., Jr.

STUDY OF URBAN EFFECTS ON PRECIPITATION AND SEVERE WEATHER AT ST. LOUIS (ANNUAL REPORT). *Illinois State Water Survey, Urbana, Ill., National Science Foundation Grant GI-33371, Rept. ISWS-73-CON-138, 56p., April 1974. 54 refs.*

NTIS: PB 230 325

Precipitation and severe weather conditions were investigated in St. Louis to determine the urban effects. Synoptic weather analyses and mixing depth-rainfall relationships show that the anomalies in 1971-1972 occurred at conditions when the convective storms were ingesting air that originated at the surface and were able to move to cloud base. On nonrain days, the urban complex has distinctive effects on the low level airflow regime and turbulence. The increase in precipitation intensity identified with rain cells over an industrial complex tends to support the importance of industrial effluents on precipitation. These may be aerosols, heat, or moisture, with the probability that aerosols are the key factor. It is possible that the increase related to St. Louis, which affects rain cells differently, may be more due to thermal factors than to aerosol explanation. This is further supported by the morning increase found in thunderstorms.

45120 **APTIC NO. 65280**

Charlson, Robert

INTRODUCTION. DEFINITION, PURPOSE AND LIMITS OF SEMINAR. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 5-13, 70-72, Aug. 1973.*

Definitions of aerosol, aerosol system, and atmospheric aerosol are given. The need for specific study and recommendations for measurements and research provided the impetus for the organization of the small discussion meeting described in this report. The primary intent of the Stockholm Tropospheric Aerosol Seminar was to have substantive discussions related to the chemical, physical, and meteorological aspects of atmospheric particulate matter. The makeup of the group discussing the aerosols, the importance of atmospheric aerosols, objectives and research needs in the atmospheric aerosol field, trends in atmospheric aerosol research in various countries, and recommendations are discussed.

45121 **APTIC NO. 65282**

Charlson, R. J.

THE ATMOSPHERIC AEROSOL SYSTEM. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 16-19, Aug. 1973. 3 refs. (Complete text not available through APTIC.)*

Due to its physical complexity, to a variety of sources and sinks, and to its chemical heterogeneity, it is useful to consider atmospheric aerosol as a system. This approach leads naturally to the recognition of potential effects of the aerosol on factors such as climate and weather, as well as to the definition of parameters needing measurement. The realm of pending problems due to human-produced materials can also be included in such model systems. A figure for the troposphere is a possible starting point for this sort of approach. The human contribution in the form of sulfate and other aerosols must be considered, particularly since gas-to-particle conversion products are usually of submicron size and therefore much longer lived than larger particles such as soil dust. (Author abstract modified)

45122 **APTIC NO. 65290**

Charlson, R. J.

MEASUREMENT OF AEROSOL PROPERTIES RELEVANT TO THE HEAT BALANCE PROBLEM. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 38-39, Aug. 1973. 4 refs. (Complete text not available through APTIC.)*

Several experiments were made measuring optical properties of aerosols to study the terrestrial heat balance. Results can be used to identify global background aerosol light scattering and absorption via field experiments. Studies were made of field methodologies with optical instruments and of methods for measuring the absorption coefficient of aerosols. Due to the availability of lidar and the need for remote sensing of the altitude-dependence of atmospheric aerosol, an experimental study of the relation of 180 deg light scattering to the relevant integrated scattering coefficients is needed. A method for measuring the albedo contribution of aerosol is presented based on the principle of the integrating nephelometer. Field experiments were coordinated with several other groups. (Author abstract modified)

45123 **APTIC NO. 65288**

Hanel, G.

PHYSICAL PROPERTIES OF ATMOSPHERIC AEROSOL PARTICLES VERSUS RELATIVE HUMIDITY. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 35, Aug. 1973. 3 refs. (Complete text not available through APTIC.)*

The volume and complex refractive index of aerosols were measured as functions of relative humidity and evaluated with the help of the same aerosols by newly developed techniques. Together with measurements of the relevant aerosol size distribution, these measurements allow realistic calculations of radiative properties of freely suspended aerosol particles versus relative humidity as well as condensation processes clouds.

45124 **APTIC NO. 65461**

Hofmann, D. J., J. M. Rosen, and T. J. Pepin

INFLUENCE OF THE TROPOPAUSE HEIGHT ON THE GLOBAL STRATOSPHERIC AEROSOL BURDEN AND IMPLICATIONS FOR THE RECENT INCREASE IN OZONE. *Wyoming Univ., Laramie, Dept. of Physics and Astronomy, Office of Naval Research Contract NOOO14-70-A-0266-0005, Rept. GM-16, 24p., Dec. 1973. 15 refs.*

The influence of the tropopause height on the global stratospheric aerosol burden and implications for the recent increase in ozone are discussed. Some asymmetries in the global distribution of total O3 can be explained in terms of the tropopause height variations. During local winter and spring in each hemisphere, O3 is thought to be transported poleward from equatorial regions. A gradual buildup of O3 consequently occurs at high latitudes, and a marked increase in total O3 is noted. The observed buildup of total O3 in the south polar region is about 10-20% less than in the corresponding season in the north polar region. The high polar tropopause in the Austral winter results in less stratospheric volume available than during the corresponding season in the northern hemisphere. It is estimated that a 1 km decrease in the tropopause height will increase the total O3 by about 5%. The difference in tropopause height during local winter between the north and south polar regions was 2.5 km in 1957-1958. This would give about a 12.5% total O3 difference in reasonable agreement with that observed. The tropopause height appears to be a significant factor in the interpretation of total O3.

45125 **APTIC NO. 65291**

Joseph, J. H.

ON THE NEED FOR COMPLETE AEROSOL EXPERIMENTS. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 40, Aug. 1973. 5 refs. (Complete text not available through APTIC.)*

Radiation studies in the atmosphere can be used in measurements of aerosol absorption, depending on independent information on aerosol properties and their variation with space and time, as well as on the ground surface albedo. Ratios of aerosol absorption to backscatter inferred from global and diffuse radiation measurements in many locations were compared with critical ratios for heating from available theories to show that at least half the aerosols would heat the atmosphere-surface system when the appropriate surface albedo is taken into account. Assumptions on the size distribution and phase function of the aerosol were important in this study. The aerosol optical depth and its variation with wavelength were measured for desert, clear, and city aerosols. The optical depth may vary with respect to wavelength. Without simultaneous in situ measurements, it is very difficult to say very much more about the aerosol and its variability. It is important to evaluate the representativeness of spot measurements of any kind for regional air properties. (Author abstract modified)

45126 **APTIC NO. 65292**

Joseph, J. H.

TRENDS IN CLEAR AIR AEROSOL CONTENT OVER JERUSALEM. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 41, Aug. 1973. 4 refs. (Complete text not available through APTIC.)*

The availability of a long series of radiation measurements in Jerusalem together with the absence of industry makes it possible to infer an increase in the amount of clear air aerosol of about 40% since the early thirties. This is independent of the increased stratospheric aerosol content due to the eruption of Mt. Agung. This increase could in fact be isolated only in the winter when the tropospheric turbidity was at its yearly minimum. (Author abstract)

45127 **APTIC NO. 65343**

Junod, A.

METEOROLOGICAL EFFECTS ON ENVIRONMENTAL POLLUTION. *Beckman Instruments Process S.A., Geneva (Switzerland). Proc. Int. Symp. Environ. Meas., Geneva, Switzerland, 1973, p. 91-95. (Oct. 2-4.)*

The effects of meteorology on environmental pollution, the role of meteorological factors in air pollution abatement, and the effects of meteorology on pollution in Switzerland are reviewed. Meteorology can affect the production of pollutants, such as those caused by heating; it can affect emissions, such as affecting the plume rise; it can affect dispersion in many ways through effects of wind, stability, and topographic interactions; and can affect ambient air pollution near the ground. Equations can be used to determine the effect of a new emission source on air quality when meteorology is considered.

45128 **APTIC NO. 65294**

Mohnen, V.

STATUS REPORT ON THE ASRC - AEROSOL NETWORK. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 43-50, Aug. 1973. 16 refs. (Complete text not available through APTIC.)*

Atmospheric aerosol concentrations over the seas were measured and sources and sinks were studied. Aerosol observations were made four times per day by a photoelectric aerosol detector on ships. The aerosol concentration, position, time, and meteorological data were key punched and analyzed by computer to relate variation in aerosol concentration to meteorology. The continents were the major source of large concentrations of aerosols, although some aerosols were generated by bubbles and breaking waves. The number concentration of aerosols was generally reduced to background by mid-Atlantic although occasions occurred concurrent with the Bermuda-Azores build up when concentrations approaching 1000 cu cm bridged the Atlantic. A hyperbolic approximation was accurate for prediction of clear weather aerosol concentrations east of the U. S. Clouds and fog seemed to be important sinks for surface concentrations at low levels. Aerosol concentrations at sea were extremely variable. Aerosol data obtained by cooperating observers aboard merchant ships were of good quality, although sometimes contaminated by frequent passage of many ships through narrow lanes. Aerosol data from cooperating observers on oceanographic ships and ocean stations were also of good quality, although contamination could occur when the ship was stationary. (Author conclusions modified)

45129 **APTIC NO. 65283**

Mohnen, Volker A.

GAS TO PARTICLE FORMATION PROCESSES. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 20-24, Aug. 1973. 9 refs. (Complete text not available through APTIC.)*

The heterogeneous gas-aerosol system can be understood on the basis of a chemical transformation model. With heteromolecular nucleation theory, one can estimate the production rate of critical sized embryos, while heteromolecular condensation theory describes their further growth. An alternative phase transition process for gases with low volatility exists via sorption on pre-existing aerosols. Certain qualitative predictions can be made such as: heteromolecular nucleation and condensation depends greatly on relative humidity; and sulfuric acid seems to be the prime candidate to nucleate first in a mixture of atmospheric air (polluted or unpolluted). Once a center for condensation is formed in a system that is free of particles, sorption processes become increasingly important for phase transition. (Author abstract modified)

45130 **APTIC NO. 65370**

Oden, Svante and Torsten Ahl

THE LONGTERM CHANGES IN THE PH OF LAKES AND RIVERS IN SWEDEN. *Preprint, Agricultural College, Uppsala (Sweden), Dept. of Soil Science and National Swedish Environmental Protection Board, Uppsala (Sweden), 7p., 1973 (?). 7 refs.*

The long-term changes in the pH of lakes and rivers in Sweden was investigated. Data on pH for the 15 Swedish river systems which were investigated since 1965 are tabulated. The change in acidity is not only due to a fallout of excess acids from the atmosphere, but also to direct water pollution from domestic and industrial wastes. An indirect effect may arise from changes of the structure in forestry and agriculture. The shift in the use of nitrogen fertilizer from nitrate to ammonia formulations gives rise to an acidifying effect on farm soils. A rough estimate of the net increase of excess acids in the drainage area of the Great Lakes between 1965 and 1969 amounts to approximately 15 kg of sulfuric acid per hectare. The atmospheric sources alone cannot account for this amount. Consequently, further studies are needed to evaluate the role of the different contributions to the increasing acidity of the Swedish river systems. The situation is similar for the small lakes, and the only explanation for the acidity is fallout of acids from the atmosphere.

45131 **APTIC NO. 65477**

Oden, Svante and Rune Andersson

THE LONGTERM CHANGES IN THE CHEMISTRY OF SOILS IN SCANDINAVIA DUE TO ACID PRECIPITATION. *Preprint, Agricultural College, Uppsala (Sweden), Dept. of Soil Science, 20p., 1973 (?). 13 refs.*

The long-term changes in the chemistry of soils in Scandinavia due to acid precipitation were investigated. The areal distribution of soil pH in the a-layer (0-5 cm) is illustrated. Soils with a pH less than 3.4 form an almost continuous zone along the Scandinavian coast to the Southwest. A small area appears in the middle of Sweden where alum shale has been burnt for some decades. A third area is located in the north of Sweden where pH values higher than 4.0 appear. The distribution reflects regional influence from the central European acidification center and locally from sources in the vicinity. One source was formed as a result of emissions of sulfur dioxide from pulp industries along the Swedish coast to the Baltic Sea during more than 50 yr. An additional effect may be due to the land rise along this coast, 1 m in 100 yr, resulting in exposure of hydrogen sulfide containing soils. Hydrogen sulfide will then vaporize, be oxidized in the atmosphere to SO2 and sulfuric acid, and finally be brought down to the ground in the surroundings. The top soil will consequently be acidified.

45132 **APTIC NO. 65289**

Ottersten, H.

SONIC AND MICROWAVE RADAR SOUNDING OF ATMOSPHERIC STRUCTURES. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 36-37, Aug. 1973. 6 refs. (Complete text not available through APTIC.)*

Refractive index fluctuations in clear atmosphere are generated by small-scale turbulent mixing of adjacent volumes of air of contrasting temperature and water vapor content. With sensitive radars, the backscattering of microwaves from these inhomogeneities may be utilized to provide images of atmospheric structure, where regions of turbulent activity and enhanced variability can be delineated. Audible sound waves may be used in an analogous way to outline the distribution of temperature variability within temperature inversion zones and in convective activity in clean air. Ultra-sensitive radars with large, steerable antennas are capable of sensing and resolving turbulent structures in clear air at high altitudes (less than 20 km) and long ranges (less than 100 km) and to provide spatial and temporal coverage for determination of three-dimensional configuration and evolution with time. Vertically-pointing radars and sodars are used successfully in the lower clear atmosphere (less than 2 km) to display on a time-height diagram the fine-scale structure of the air mass drifting through the overhead beam. These techniques have provided new information on gravity waves, dynamic instability, and the genesis of turbulence in horizontally stratified, statically stable, shear layers, and on clear-air convective cells and thermal plumes in the lower atmosphere. In Sweden, both a sodar and a radar were completed recently for vertical sounding of the planetary boundary layer. The results indicate that the methods are valuable for fog monitoring and in radio-wave propagation research. The capability of the sodar to continuously monitor the low level temperature structure is of particular interest to the air pollution meteorologist. (Author abstract)

45133 **APTIC NO. 65340**

Pitts, James N., Jr., Alan C. Lloyd, and Jeremy L. Sprung.

CHEMICAL REACTIONS IN URBAN ATMOSPHERES AND THEIR APPLICATION TO AIR POLLUTION CONTROL STRATEGIES. *Beckman Instruments Process S.A., Geneva (Switzerland), Proc. Int. Symp. Environ. Meas., Geneva, Switzerland, 1973, p. 27-61, 121 refs. (Oct. 2-4.)*

The complex interactions among the various elements of the air pollution system are discussed, as well as the need for a more extensive and reliable data base which would define the ambient levels, chemical and physical interactions, and toxic effects of air pollutants more accurately. The health effects of smog, the composition of sulfate particulates, sulfur dioxide synergistic effects, effects of smog on plants, and economic effects of smog are reviewed. Air quality criteria, primary air quality standards, and emission controls are described. Smog can be reduced by emission controls applied to motor vehicles and stationary sources and by societal controls such as surcharges on parking fees. Smog alerts, emissions of primary pollutants, emission inventories, smog formation chemistry, and smog chamber experiments are also reviewed.

45134 **APTIC NO. 65287**

Quenzel, H.

AN INTEGRATED PROGRAM TO COMPARE THE MEASURED WITH THE CALCULATED ATMOSPHERIC RADIATION FIELD. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 33-34, Aug. 1973. (Complete text not available through APTIC.)*

From mid-June to mid-August 1971, radiation measurements were made in a semi-arid zone of southwest Africa about 500 km from the coast. All radiation measurements were made in the spectral region of solar radiation (0.4-2.5 micron), but only in small wavelength intervals in which there was little absorption by atmospheric gases. Intensity of direct solar radiation was measured with an interferance filter actinometer. Angular dependent intensity of sky light was measured with an absolutely calibrated grating spectrometer. Angular dependent polarization of the sky radiation was measured with an interference filter polarimeter. Angular dependent intensity of the ground was measured with an absolutely calibrated interference filter radiometer installed in an aircraft. Downward and upward radiation fluxes were measured with a solarimeter exposed 120 m above the ground. All air samples were collected 30 m above the ground. Radiation scattered by an air volume was measured with two nephelometers. The number and size distribution of aerosol particles was measured with a Royco light scattering aerosol counter, and the real part of the refractive index of the aerosol particles was collected with a large impactor. Wind, air temperature, and humidity were measured at 2, 30, 60, and 120 m above the ground. From the collected data, information was obtained about the mechanism of radiative transfer. A numerical approach using the expansion of the scattering function into a series of Legendre polynomials was used to calculate spectral radiance at any point of the sky and to compare the calculated and measured intensities to obtain values of the strength of the continuum absorption, possibly due to aerosols. Computer programs are available to calculate the scattering properties of a volume of air containing a variety of different aerosol particles. The size distribution of aerosols can be calculated from the extinction coefficients obtained from the measurements of direct solar radiation. (Author abstract modified)

45135 **APTIC NO. 65410**

Sapetti, C. and E. Arduino

POLLUTION BY LEAD NEAR THE TURIN-MILAN HIGHWAY. *(Inquinamenti da piombo nei pressi dell autostrada Torino-Milano). Text in Italian. Agrochimica, 17(6):540-545, Oct. 1973. 10 refs.*

Soil samples taken at 5-50 m from the Turin-Milan highway at depths ranging from 0 to 30 cm on two different sites were analyzed for lead residues by atomic absorption spectrophotometry following extraction by means of ammoniacal EDTA at pH 9. Soil samples from the surface layer taken in one well-ventilated site contained 11.5-12.4 ppm lead, while subsoil samples had 5.7-9.8 ppm. Soil samples taken in the other site with poor ventilation contained 23.5-43.3 ppm lead in the surface layer, and 9.2-15.4 ppm in the subsoil. Decrease of the lead concentrations in the soil with increasing depth and distance from the highway was noted. Plant samples taken from the same sites contained 6.4 to 32.2 ppm lead. Lead was fixed predominantly to the exchange complex; partly to the clay fraction, and partly to the humic fraction.

45136 **APTIC NO. 65463**

Start, G. E., C. R. Dickson, L. L. Wendell

DIFFUSION IN A CANYON WITHIN ROUGH MOUNTAINOUS TERRAIN. *National Oceanic and Atmospheric Administration, Idaho Falls, Idaho, Air Resources Labs., NOAA TM ERL ARL-38, 53p., Aug. 1973. 19 refs.*

An accelerated field measurement program was conducted to quantify atmospheric diffusion within a deep, steep-walled canyon in rough, mountainous terrain. Two principle objectives were pursued: impaction of plumes upon elevated terrain and diffusion of gases within the canyon versus diffusion over flat, open terrain. Oil fog flow visualizations provided qualitative information; quantitative diffusion measurements were obtained using sulfur hexafluoride gas with analysis by highly sensitive gas phase coulometric techniques. Eleven 45 to 60 min gaseous tracer releases were conducted. Stability category-related differences in canyon diffusion versus flat terrain diffusion were found. Daytime lapse conditions showed little difference. Neutral stability tests showed five times greater dilution for canyon axial concentrations; strong inversion tests resulted in canyon plume centerline dilutions 15 times greater than calculations using parameters derived for flat terrain. Plume effluents frequently impacted against elevated terrain. One-hour total integrated concentrations measured on the canyon floor and walls compared to 1-minute axial concentrations collected away from the terrain showed peak to average concentrations ratios of 1.5:3. There appeared to be additional physical mechanisms affecting plume dilutions that are peculiar to Huntington Canyon. (Author abstract modified)

45137 **APTIC NO. 65342**

Wallen, C. C.

WMO ACTIVITIES RELATING TO ATMOSPHERIC POLLUTION AND OTHER PROBLEMS OF THE HUMAN ENVIRONMENT. *Beckman Instruments Process S.A., Geneva (Switzerland), Proc. Int. Symp. Environ. Meas., Geneva, Switzerland, 1973, p. 77-89. (Oct. 2-4.)*

Research studies conducted by the World Meteorological Organization are reviewed with respect to the environment. Changes in pollution levels over the past decade have revealed a degradation of the environment. The increasing concentration of air pollution at the so-called background level is discussed. Man-made pollution cannot be cleaned from the environment naturally, as natural pollution such as volcanic dust was cleaned in the past. The gradual increase in low-concentration air pollution requires that a worldwide monitoring system be set up. Such a network became operational in July 1970 with 15 stations in 11 countries. The network will be continued and expanded to study overall trends in background pollution and possible impact on global climate. The historical data on global climate are reviewed, and possible changes are discussed. Released heat, increased particle concentration, increased turbidity, and increased carbon dioxide concentrations may cause climate modifications. The SST engines may cause meteorological changes by increasing atmospheric water vapor and by changing the ozone content in the upper atmosphere.

45138 **APTIC NO. 65349**

Zettwoog, P.

VOLCANISM AND ATMOSPHERIC CONDITIONS. *Beckman Instruments Process S.A., Geneva (Switzerland), Proc. Int. Symp. Environ. Meas., Geneva, Switzerland, 1973, p. 133-141. (Oct. 2-4.)*

The average annual emissions of particulate matter to the atmosphere from volcanoes has been 4.5 million, about three times industrial emissions. However, since industrial emissions double every 15-20 years, by the year 2000 they will equal natural volcanic emissions. The cumulative effect of both types of emissions will be a general fall in temperature. Historical records show that increased volcanic activity did cause decreased temperatures. The decreased temperatures are due to decreased solar energy reception. The effects of volcanoes on the atmosphere can be used to extrapolate expected effects from industrial emissions of aerosols and gases. Also, knowledge of industrial emissions can be used to study volcanic emissions. Air pollution monitoring instrumentation can be used in volcanic studies. The similarities and differences between volcanic and industrial emissions are discussed. Methods to monitor gasesous and particulate emissions from volcanoes are reviewed.

1972

45139 **APTIC NO. 65470**

Catton, I., R. L. Perrine, J. Waggoner, J. Dias, and A. Wassel

PUBLIC HEALTH RISKS OF THERMAL POWER PLANTS. APPENDIX II. POLLUTANT PATHWAYS. *California Univ., Los Angeles, School of Engineering and Applied Science, UCLA-ENG-7242, 80p., May 1972. 85 refs.*

The transport of pollutants from nuclear power plants is discussed including meteorological transport, hydrological transport, and transport by food chains and webs. A complete model for simulating diffusion of pollution in the atmosphere is not available, and approximate methods are used. Methods to estimate atmospheric dispersion are discussed, and the basic procedures are outlined. The effect of inversion layer height is emphasized. A methodology was developed by which hydrologic risk can be established for accidental release of radionuclides from a nuclear power reactor. Risk can be established by computing the activity in the water supply. Radionuclide buildup in food chain organisms are discussed based on the assumption of chronic contamination by continuously released isotopes. Heavy metals released by fossil fueled plants can accumulate in food chains. With the proposed phasing out of leaded gasoline, the relative contribution of lead from fossil fuel power plants will increase. Considerable controversy exists as to the relative importance of inhalation and ingestion as pathways of Pb entry into man.

45140 **APTIC NO. 65681**

Nakajima, Satoshi

ON THE AIR POLLUTION OF SULFUR DIOXIDE IN THE URBAN AREA OF KUSHIRO. *(Kushiro-shi chushinbu no aryusangasu ni yoru taikiosen ni tsuite). Text in Japanese. Kushiro Kogyo Koto Senmongakko Kiyo (Repts. Kushiro Tech. Coll.), no. 6:109-114, 1972. 1 ref.*

The basic indices of air pollution were calcuated while analyzing hour value concentrations of sulfur dioxide in relation to meteorological conditions for winter. The period covered is 3 fiscal years, 1968-1970. The average concentration was highest for 1968 and lower for 1969 and 1970, both of which gave about the same level of the concentration. In the April-October period each year, the concentration is generally stable at 0.01 ppm but drastically increases thereafter to reach a peak of over 0.05 ppm in the month of January. The comparatively higher concentration of sulfur dioxide during the last 4 months of a fiscal year can be attributed to the room heating. Analysis of hourly changes in the sulfur dioxide concentration showed that there are two peaks in a day, one taking place at 10 am and the other between 5 pm and 6 pm, a phenomenon typical of a London type municipal air pollution. All values of sulfur dioxide measured are well below the maximum allowable values set for the national standards. Using the average wind velocity as a parameter, the average hourly value obtained by averaging those hourly values for 7 am through 1 pm when the sulfur dioxide concentration is comparatively higher was correlated to temperature. The correlation coefficient was -0.91 at the average wind velocity of 0.0 - 0.9 (m/sec), -0.60 at 1.0 - 1.9, -0.60 at 2.0 - 2.9, -0.72 at 3.0 - 3.9, -0.74 at 4.0 - 4.9, and -0.70 at 5.0 or more.

1971

45141 **APTIC NO. 65411**

Vadot, L.

COMBINED ON-SITE AND MODEL INVESTIGATIONS OF DENSITY FLOW IN THE GRENOBLE AREA (WITH RESPECT TO ATMOSPHERIC POLLUTION). *(Kombinierte Studie an Ort und Stelle sowie am Modell von Dichtestroemungen im Gebiet von Grenoble (mit Bezug auf die Luftverunreinung)). Text in German. Ann. Meteorol., no. 5-193- 197, 1971. (Presented at the International Congress for Alpine Meteorology, 11th, Obertsdorf, Germany, Sept. 22-26, 1970.)*

The altitude of the industrial city of Grenoble is 200 m while the surrounding mountains rise to altitudes of 1500-3000 m. This causes density flows which influence the diffusion of locally- produced air pollutants. The air flow patterns were studied at various altitudes on site using an observation balloon, and also with an hydraulic model. The air flow patterns were simulated by colored salt solutions of various concentrations. The nightly downhill flow of air and its reversal could be duplicated in the model experiments; a complete 24-hour cycle could be reproduced in experiments lasting 1/2 to 1 hr. The reproduction of thermal updrafts in the model experiments demonstrated the density flow and the temperature inversion which are changed at the city limits. The model experiments are a valuable tool in climatological investigations to define sources of air pollution and polluted areas. The results of the model experiments were generally in good agreement with those of on-site observation.

1970

45142 **APTIC NO. 65303**

Sturman, Gerald M. and Tio C. Chen

CONCENTRATION OF MOTOR VEHICLE GENERATED POLLUTANTS IN THE VICINITY OF URBAN HIGHWAYS. *Preprint, Society of Engineering Science, Inc., p. 565-587, 1970. 14 refs. (Presented at the Society of Engineering Science, Annual Meeting, 8th, Washington, D. C., Nov. 9-11, 1970.)*

A methodology to predict the concentration of motor vehicle generated pollutants in the vicinity of four alternative roadway configurations was developed. It can be used to derive estimates of pollutant emissions and their geographical distribution throughout the city. Estimates of pollution levels in the vicinity of highway configurations in a meteorological model are described. This approach was applied to a large American city where projected traffic data for 1990 and the measurable pollutant data for 1968 were available. The pollutants considered were sulfur dioxide, total suspended particulates, carbon monoxide, carbon dioxide, hydrocarbons, nitrogen oxides, total oxidants, and aliphatic aldehydes. The methodology consists of examination of existing data, prediction of background emission, contribution of traffic, estimate of variation of pollutant concentrations with distance from source - open roadway alternatives, and tunnel alternatives.

45143 **APTIC NO. 65016**

INSTRUCTION FOR THE DESIGN OF CHIMNEYS FOR COMBUSTION PLANTS. *(Instruction puur la construction des cheminees dans le cas des installations de combustion). 8p., 1970 (?). (Source not indicated.) Translated from French, 13p.*

An instruction is given for the design of chimneys and the determination of the necessary elevation of the outlet to free air from fume ducts for combustion plants. The equipment and design characteristics of boilers should allow good dispersion of combustion gases so as not to produce high concentrations of pollutants. Boiler plants with total output of installed thermal equipment greater than 200,000 th/hr require a special determination of effective stack height. The value of the effective stack height is computed depending on the sulfur content of the fuel. The formula for computing stack height is given and discussed. Natural and artificial obstacles which would disturb dispersion of combustion gases are those located at a horizontal distance less than 10(h sub p plus h sub s) from each fume duct and which have a width greater than 2 m.

1969

45144 **APTIC NO. 65405**

Electricite de France, Paris

EVALUATION OF AIR POLLUTION DUE TO CLASSIC THERMAL POWER PLANTS TO BE BUILT IN THE FUTURE. *(Evaluation de la pollution de l air par les futures centrales thermiques classiques). Text in French. Rept. EDF, DNB/RR, 22p., April 1, 1969.*

Critical assessment is given of Sutton s, CONCAWE, Holland s and, USSR s formulas for the determination of atmospheric dispersion of pollutants as a basis for the evaluation of the sulfur dioxide concentration levels caused by planned thermal power plants. After the sulfur dioxide emission is determined from the fuel consumption and the fuel sulfur content, dispersion of SO2 in the atmosphere is calculated as a function of such parameters as the geometric height of and the flow rate in the stack, and thermal lift, and the flue gas outlet temperature. The formulae by Sutton and CONCAWE corresponded to best reality, both theoretically and in experimental verifications.

1959

45145 **APTIC NO. 65300**

Eriksson, Erik

THE YEARLY CIRCULATION OF CHLORIDE AND SULFUR IN NATURE: METEOROLOGICAL, GEOCHEMICAL AND PEDOLOGICAL IMPLICATIONS. PART I. *Tellus (Uppsala), 2(4):375-403, Nov. 1959.*

The circulation of airborne oceanic constituents is discussed. About 1000 million tons a year are produced and about 90% is precipitated over the ocean. The rest is carried into continents and is brought back to the sea in rivers. A major part of the sulfur in the atmosphere is of oceanic origin, but does not originate as chloride through spray emitted from breaking waves. The release of hydrogen chloride from sea salt particles due to absorption of oxidized sulfur dioxide is quantitatively important and mainly responsible for variations in the chlorine/sodium ratio in precipitation. The deposition of chloride in precipitation over continents indicates the main areas of inflow of maritime air. Sea salts are carried to the ground from the air at a rate of 1-2 cm/sec. This agrees with the turbulent nature of air close to the ground. The reduction of sulfur in groundwater can cause precipitation of calcium and magnesium which modifies the chemical properties of groundwater considerably. The role of airborne sea salt components for the development and properties of soils is discussed. (Author abstract modified)

BASIC SCIENCE AND TECHNOLOGY

1974

45146 **APTIC NO. 65502**

Andrushkiw, R. I., P. Hrycak, and M. J. Levy

TEST OBJECT-ENVIRONMENT INTERACTION IN EXTERNAL FLOWS. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th, Cost. Eff. Environ. Sci., Washington, D. C., 1974, p. 252-256. 21 refs. (April 28-May 1.)*

The kind of flow regime existing during a test represents a significant aspect of the interaction between the test set up and the environment, since it governs the resistance to flow and heat transfer in cases where there exists a temperature differential between the fluid and the test object, or the confining walls. In general, the process of transition from laminar to turbulent regime is preceded by flow instabilities, which may in certain cases be treated by the Orr-Sommerfeld equation, a linearized form of the Navier-Stokes equation, to which the method of small disturbances (MSD) may be applied to determine the instabilities of a given flow. The Meissner s Entropy Principle (MEP), the modified Meissner s Entropy Principle (MMEP), and the method of the Order of Magnitude of Shearing Stress Esimated yield, in a number of cases of external flows, results that seem to be in accord with the MSD in particular cases and with the available experimental findings. The MEP appears to be equivalent to the MSD in getting the point of instability, when both methods may be made to work, while the MMEP yields close estimates to the critical Reynolds number starting from the basic information on shear stress and the dissipative processes in general, in both regimes, which at present no other method can accomplish. (Author conclusions modified)

45147 **APTIC NO. 68057**

Boyer, Kenneth W. and Herbert A. Laitinen

LEAD HALIDE AEROSOLS: SOME PROPERTIES OF ENVIRONMENTAL SIGNIFICANCE. *Environ. Sci. Technol., 8(13):1093-1096, Dec. 1974. 15 refs.*

The physical and chemical properties of laboratory-pure lead halide aerosol particles were investigated. Aerosols generated from a lead bromochloride (PbBrCl) meld had a temperature-dependent bromide ion excess and chloride ion deficiency with respect to stoichiometric PbBrCl. A linear departure from the stoichiometric unity PbBrCl was accompanied by an exponential change in the rate of ultraviolet light-induced photochemical decomposition. When exposed to carbon dioxide and water vapor, the laboratory-pure aerosols were quite stable toward halogen loss by hydrolytic exchange, especially compared to literature reports of rapid halogen loss by automobile exhaust particulates. The large halogen losses observed for automobile exhaust particulates are not a fundamental characteristic of lead halide aerosols formed in the absence of the automotive exhaust environment. (Author abstract modified)

45148 **APTIC NO. 65582**

Charlson, Robert J. and Allan P. Waggoner

VISIBILITY, AEROSOL AND COLORED HAZE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 19p., 1974. 22 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-261.)*

The impact of visibility restriction and visible clouds of haze (as ranking higher than any other effects of air pollution) is presented. One reason for the objectionable nature of visible anthropogenic haze may well be the fear of health effects; however the optical quality of air is almost always dramatically degraded at particulate concentrations well below levels where health effects are expected. Recent visibility experiments are aimed at characterizing those pollutants which cause the appearance of the visible colored haze which is frequently noted in urban and near-urban areas. Several factors can be isolated which contribute to the colored haze: wavelength dependent light scattering by particles; wavelength dependent light extinction by particles; wavelength dependent light absorption by particles; and wavelength dependent light absorption by gases (e.g., nitrogen dioxide). Any one of these may dominate in a given circumstance, depending both on atmospheric composition and viewing condition (sun and viewer positions). In turn, several gas and aerosol compositional factors are involved: particle size distribution; particle complex refractive index (real and imaginary part); size dependence of refractive index; NO2 concentration; and relative humidity and its effect on size distribution. The role of these parameters in general and the basic scientific principles needed for explaining colored haze are emphasized. (Author abstract)

45149 **APTIC NO. 65249**

Esmen, Nurtan A.

NEAR PARTICLE INTERACTIONS BETWEEN DROPLETS AND SOLUBLE PARTICLES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 24p., 1974. 5 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-116.)*

Theoretical and experimental work on aerosol physics research at the University of Delaware is described. It centers on the effect of coupled diffusiophoresis and thermophoresis on insoluble and soluble aerosols near evaporating droplets. Experimental work using insoluble aerosols confirmed the applicability of the Waldmann-Schmidt diffusiophoretic velocity equation to particle sizes in Knudsen numbers less than 0.2. The applicability of a coupled form of the Waldmann-Schmidt diffusiophoresis equation with Brock s equation of thermophoretic motion was also confirmed for the same aerosol. The experiments were performed using a simple sedimentation chamber with a vapor gradient superimposed. Preliminary experiments with a soluble aerosol are reported and a theoretical model on the effects of diffusiophoresis and thermophoresis is presented for the near particle interactions between droplets and both soluble and insoluble particles. The theoretical analysis suggested that the collection efficiency due to phoretic forces is dependent on the system temperature. The phoretic enhancement of the collection efficiency has a particle size dependent maximum at a particle size dependent temperature above which the enhancement rapidly diminishes and becomes retardation. (Author abstract modified)

45150 **APTIC NO. 68082**

Ioki, Yoshikazu, Masahiko Kodama, Yusaka Tagashiar, and Chikayoshi Nagata

OXYGENATION OF BENZO(A)PYRENE IN A MODEL SYSTEM USING TRIFLUOROACETIC ACID AND HYDROGEN PEROXIDE. *GANN Japan J. Cancer Res., 65(4):379-380, Aug. 1974. 6 refs.*

A chemical model system using trifluoroacetic acid and hydrogen peroxide was devised for the oxygenation of the carcinogen benzo(a)pyrene in a manner similar to the previously observed action of the mono-oxygenase, arylhydrocarbon hydroxylase, obtained from the microsomal fraction of rat and mouse liver. The hyperfine structure of the electron spin resonance spectrum of the benzene phase of the reaction appeared the same as the 6-oxybenzo(a)pyrene free radical produced by microsomal enzymatic reactions. The result obtained by ESR was further confirmed by a fluorescence measurement. The benzene phase was extracted with alkaline solution; and, after filtration, the fluorescence and excitation spectra of the water phase showed peaks at 320, 380 (shoulder), 397, and 465 nm in the excitation curve and 520 nm in the fluorescence spectrum which corresponded to the peaks 327, 380 (shoulder, 398, 467, and 520 nm in an authentic sample of 3-hydroxybenzo(a)pyrene in alkaline solution, indicating that 3-hydroxybenzo(a)pyrene was also formed in the reaction system.

45151 **APTIC NO. 65573**

Jaffe, Raphael J. and Frank C. Smith, Jr.

FACTORS AFFECTING REACTIONS IN SMOG CHAMBERS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 28p., 1974. 7 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-246.)*

Results of a study of a smog chamber illuminated by a xenon arc lamp are presented along with a study of the differences between smog chambers, including an experimental study of how various design and operational variables affect the photochemical reactions observed in smog chambers. A group of round-robin tests were conducted using these chambers as follows: irradiation of seven different hydrocarbons with nitrogen oxides; replicate runs to establish reproducibility using the propylene-nitrogen oxides system; a reactant concentration study in which 3 ppm propylene was reacted with 3, 1.5 and 0.5 ppm nitrogen oxides. Apparatus used was specifically designed to meet the objectives of the study by allowing independent variation in materials configuration, lighting conditions, and cleaning technique. The illuminator produces a collimated light beam. Plates of materials can be placed parallel to the beam axis without affecting the light conditions. This decoupling of light and materials allows independent variation of the two factors. Major apparatus items are the smog chamber; the xenon arc lamp illuminator; the thermal enclosure for the chamber; and the gas analysis instrumentation. The spectral distribution of light provided a smog chamber influencing the photochemical reaction observed. In particular, the nitrogen dioxide photodisintegration rate (k sub d or its equivalent k sub 1) does not sufficiently characterize the light conditions. Further data analysis and experimentation is required to understand the spectral sensitivity phenomena demonstrated in this work. The understanding of the hydrocarbon dioxides of nitrogen-sunlight systems, particularly in regard to the conversion of nitric oxide to NO2, is not complete.

45152 **APTIC NO. 65657**

Kanamaru, Kazuhiro and Shunichi Daito

OVER-SHOOT PHENOMENA OF OH, O, AND H RADICALS, AND THE FORMATION PROCESS OF NITRIC OXIDE (PART III). *(OH, O H rajikaru no over-shoot gensho to NO no seiseikatei. III). Text in Japanese. Preprint, Japan Society of Mechanical Engineers, Kansai, p. 64-66, March 1974. 15 refs. (Presented at the Japan Society Mechanical Engineers, Kansai Branch Meeting, 49th, Higashiosaka, Japan.)*

The major oxidation route and side reaction route of methane, formation mechanism of the CH radical and hydrogen cyanide, the disappearance mechanism of HCN, and the effect of ignoring diffusion were discussed and thermodynamically calculated. The major and side (less than 1/20) reaction routes of CH4 to nitric oxide are proposed. The over-shoot phenomena of OH and O radicals are attirubted to the over-shoot to hydrogen atom. The prompt NO formation at phi levels 1.2 or over cannot be unaccounted for by the elementary reaction of NO formation based on the Zeldovich s mechanism, even when the over-shoot of oxygen atom is taken into consideration. However, the formation of prompt NO can be accounted by the Fenimore s reaction. The rate constant and intermediate products (particularly CN radicals) are within the scope of existing qualitative theory, and not contradictory.

45153 **APTIC NO. 65168**

Konkiel, Andrzej and Jakub Poznanski

METHOD OF QUICK MEASUREMENT OF GAS HEAT VALUE. *(Metoda szybkiego pomiaru wartosci opalowej gazu). Text in Polish. Zesz. Nauk Politech. Slaski Energ., 58(437):213-225, 1974.*

A new method for the fast determination of the heating values of gaseous fuels is proposed. This method consists of measuring the temperature of combustion gases generated when burning the fuel gas in an open space by means of an injector burner. Variations depend on the fuel composition and air-fuel ratio. Measurements were performed on the temperature of combustion gases when burning mixtures of coke oven gas with air and liquid gas, with heating values ranging from 3050 kcal/cu Nm/12.7 MJ/cu nm up to 5150 kcal/cu Nm/21.5 MJ/cu nm. The temperature of the combustion gas depends linearly on the heating value of the gas. The measurement error of this method is 4%. The method is not expensive, and is simply designed to allow direct source sampling.

45154 **APTIC NO. 65587**

Lane, Douglas A. and Morris Katz

THE MODIFICATION OF BENZO(A)PYRENE UNDER SIMULATED ATMOSPHERIC CONDITIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 25p., 1974. 6 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-273.)*

A study of the modification of polycyclic aromatic hydrocarbons in the atmosphere and analysis of benzo(a)pyrene in the atmosphere is presented. A dynamic flow reactor system is described in which the modification of polycyclic aromatic hydrocarbons may be studied under many different controlled simulated atmospheric conditions. Filtered air is passed through an ozone generator capable of producing constant ozone concentrations of 0-2 ppm over long periods of time. The reactor is irradiated with a lamp, the output of which is virtually identical to solar radiation in the region 2900 A to 5000 A and corresponds to a solar zenith angle of between Z equals 40 deg and Z equals 60 deg. The half-lives for the alteration of benzo(a)pyrene under different simulated atmospheric conditions were determined. In the presence of simulated sunlight and in an ozone-free atmosphere, the half-life for the modification of benzo(a)pyrene was 5.27 hr. In the dark at both 0.5 ppm ozone and 2.0 ppm ozone, the half-life was 0.30 hr. However, in the presence of both sunlight and 2.0 ppm ozone, the half-life was only 0.10 hr. Since benzo(a)pyrene was modified at such a rapid rate, even in the dark, the standard high volume filtration method for collecting atmospheric particulate matter may yield polycylic aromatic hydrocarbon loadings that have been affected by prevailing oxidant levels.

45155 **APTIC NO. 65546**

Loh, A., A. H. Miguel, D. F. S. Natusch, and J. R. Wallace

PREFERENTIAL CONCENTRATION OF TOXIC SPECIES ON SMALL AIRBORNE PARTICLES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 31p., 1974. 22 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-201.)*

Studies of 25 trace metals and organic species in airborne particles were conducted as a function of particle size for both atmospheric samples and those derived from particle sources. Many toxic metal species are most concentrated in the smallest particles derived from a high temperature combustion source (e.g., a coal-fired power plant). Similar behavior is observed for organics associated with atmospheric aerosols. The highest concentration of trace elements are found in particles which deposit in the pulmonary region of the respiratory system. Existing particle control devices are least effective for removing the most toxic particles. Estimates of toxic element emissions based on analysis of undifferentiated fly ash collected from particle precipitators are much lower than actual emissions. A volatilization-deposition model for distribution of volatilizable species on airborne particles was developed. If it is correct, it seems probable that any high temperature combustion source is capable of producing preferential concentration of certain toxic species in the smallest respirable particles. (Author abstract modified)

45156 **APTIC NO. 65660**

Mori, Kenji, Kei Utsunomiya, Katsunori Shimasaki, Kazuya Soga, Mamoru Aoki, and Yutaka Mito

REDUCTION OF NITROGEN OXIDES BY METAL CATALYSTS(3): NO-H2 GROUP. *(Kinzoku shokubai ni yoru sanka chisso no kangen (3) NO-H2 kei). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 666, 1974. (Presented at the Japan Chemical Society, Spring Meeting, 30th, Higashi-Osaka, Japan, April 1-4, 1974, Paper 1G02).*

Gas containing 0.98% of nitric oxide, 4.15% of H2 and 94.87% of He was reduced on three different alloys, nickel-copper-cobalt, nickel-copper-iron, and nickel-copper-chromium, each at three different conditions, and the resulting gas was analyzed by gas chromatography and titration. The space velocity of the gas was approximately 2400/hr and the catalysts were heated gradually to 800 C. The NO was reduced to NH3 by H2; maximum ammonia formation was reached at the temperature which gave 100% NO conversion and the formation decreased if the temperature was increased further; the catalysts which gave the maximum NH3 formation at 400 to 500 C were the Fe-containing alloy heated at 800 or 1000 C for 5 min and the cr-containing alloy heated. at 1000 C for 5 min, and those which gave the maximum NH3 formation at 500 to 600 C were the untreated Fe-containing alloy and the cr-containing alloy treated at 800 C for 5 min; at temperatures higher than 700 C, Fe-containing alloy treated at 800 and 1000 C for 5 min, cr-containing alloy treated at 1000 C and the untreated CO-containing alloy gave less than 20% NH3 formation. A single metal catalyst (more than 99% in purity) gave the NH3 formation in the order of Cr, Cu, Co, Ni, and Fe.

45157 **APTIC NO. 65545**

Novakov, T.

SULFATES IN POLLUTION PARTICULATES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 31p., 1974. 12 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-200.)*

Experimental evidence is presented which demonstrates that combustion-generated carbon particles in the form of finely divided soot are efficient catalysts involved in sulfur dioxide oxidation to sulfates. Both soot and graphite particles in the air catalytically oxidize SO2, with soot catalyzed oxidation playing a major role even in the presence of combustion produced gases. The sulfate species produced on carbon particles are nonvolatile in vacuum but are water soluble and when dissolved increase the acidity of the solution. Field study results are compatible with this oxidation mechanism. (Author abstract modified)

45158 **APTIC NO. 68240**

Oki, Shoichi, Tomoko Kobayashi, Sachiko Ishikawa, Yoshihisa Kaneko, and Hideo Odanaka

REDUCTION OF NO BY CO ON AN IRON OXIDE CATALYST: A STUDY BY SIMULTANEOUS APPLICATION OF VARIOUS TRACERS. *(Sanka tetsu shokubaijo ni okeru NO no CO ni yoru kangen hanno: Kakushu toresa no doji shiyo ni yoru kenkyu). Text in Japanese. Preprint, Catalytic Society of Japan, Sendai, p. 104-105, 1974. 2 refs. (Presented at the Symposium on Catalysts, 35th, Sendai, Japan, Oct. 4-5, 1974, Paper 4T02.)*

The reduction of nitric oxide by carbon monoxide on iron oxide catalyst was followed by using a mixture of CO (carbon-13), NO, N2 (nitrogen-15), and carbon dioxide (oxygen-18). The total pressure changes in the reaction were followed with a mercury manometer, and the reaction gas samples were analyzed with a mass spectrometer. It was deduced from the experimental results that NO is in equilibrium with N(a) and O(a). When N(a) reacts with NO, formation of N2 and O(a) occurs. When CO and O(a) react, CO2 is formed. Furthermore, on the catalyst surface, equilibria are established as follows: CO with CO(a); CO(a) and O(a); and CO2 and O(a) with CO3(a).

45159 **APTIC NO. 65700**

Quan, Victor

NITRIC OXIDE FORMATION IN TURBULENT JET DIFFUSION FLAMES. *Acta Astronaut., 1(3-4):505-521, March-Arpil 1974. 15 refs.*

Combustion and nitric oxide formation in the turbulent mixing region between a semi-infinite stream of oxidant and a fuel jet issuing from a finite orifice are analyzed for both planar and axisymmetric flows. The flowfield is considered to consist of three major components: fuel, oxidant, and combustion products. Nitric oxide is treated as a trace species. The fast fuel-oxidant combustion reaction is assumed to be diffusion-limited: whereas the relatively slow nitric oxide formation is taken as rate-limited. Turbulent transports of momentum, enthalpy, and species are described by Prandtl's mixing length theory. The chemical kinetics of NO formation are assumed to follow the Zeldovich mechanism. Local similarity relations are obtained for the flow properties, and a nonsimilar continuity equation is obtained for NO concentration; these are solved by standard numercial methods. Molecular mixing of the hot combustion product eddies with the cool oxidant or fuel eddies has a great influence on the amount of NO formed, although its effect on the time-averaged fluid properties is small. Both limits of no local molecular mixing and complete mixing are examined. Results for the flame contour and for the profiles of velocity, temperature, and concentration of fuel, oxidant, products, and NO are illustrated. The NO concentration profile has a maximum in the fuel-rich region throughout the flame. (Author abstract)

45160 **APTIC NO. 68092**

Shannon, D. G. and L. O. Fine

CATION SOLUBILITIES OF LIGNITE FLY ASHES. *Environ. Technol., 8(12):1026-1028, Nov. 1974. 5 refs.*

Concentrations of calcium, sodium, magnesium, and iron were determined in water extracts of four lignite fly ashes from three Northern Great Plains mines in order to study the cation solubilities of the various ashes. The main mass of soluble cationic material released was represented by Ca and Na, although a considerable variability existed among the four ashes in proportional and absolute amounts solubilized. Magnesium and iron generally were solubilized at rates roughly one to two orders of magnitude less than Ca and Na. As the ratios of water to ash were increased, generally greater relative amounts of Ca, Mg, and Fe and lesser relative amounts of Na were found in solution. Dust collector ash was higher in sulfate than electrostatic precipitator ash, and approximately 50% of the cations solubilized by water from dust collector ashes appeared to exist as sulfates. A considerable portion of the Ca, Mg, and Na is believed to exist in the ash as oxide, thus giving rise to high pH values for water suspensions. (Author abstract modified)

45161 **APTIC NO. 68138**

Takshashi, Seiji, Takeshi Murata, and Tsunezo Takeda

ANALYSIS OF MULTI-COMPONENT TEST MATERIAL BY MASS CHROMATOGRAPHY: AUTOMOTIVE EXHAUST GASES, FLUE GASES, POLYMER COMPOUND THERMOLYSIS PRODUCTS. *(Masu kuromatogurafi ni yoru taseibun o fukunda shiryo no bunseki: Jidosha haiki gasu, endo gasu, kobunshi kagobutsu no netsu bunkai seiseibutsu). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 13-15, 1974. (Presented at the Japan Chemical Society Symposium on the Mass Spectrometry of Organic Compounds, 9th, Sendai, Japan, Oct. 2-4, 1974, Paper 1T05.)*

Mass chromatography (a combination of mass spectrometry and gas chromatography) was used to analyze the components of automotive exhaust gas, flue gas, and the thermal decomposition products of high polymer compounds. Mass numbers (m/e) ranged from benzene (M+ 78) to fluoranthene and pyrene (M+ 202). Peaks for alkanes, benzene and alkyl benzenes, benzofuran, phenols, styrenes, and other aliphatic and aromatic compounds were resolved.

45162 **APTIC NO. 65686**

Tanaka, Ikuzo

PHOTOCHEMICAL REACTIONS OF BASIC MOLECULES RESPONSIBLE FOR AIR POLLUTION. *(Kihonteki bunshi no kokagakuhanno). Text in Japanese. Bussei (Solid State Phys. Chem.), 15(4):167-179, April 1974. 74 refs.*

Photochemical reactions involving moisture, methane, ethylene, oxygen, ozone, carbon monoxide, carbon dioxide, nitric oxide, and nitrogen dioxide are discussed. Theoretical and experimental studies are reviewed concerning the effects of ultraviolet radiation, photoionization, electron and ultraviolet spectroscopy, and electronic structure and energy curves of basic molecules. Photoelectric phenomena are discussed.

45163 **APTIC NO. 68241**

Todo, Naoyuki, Yuzuru Kurita, Hiroyuki Hagiwara, Akifumi Ueno, and Toshio Sato

THE EFFECTS OF COEXISTING GASES ON THE AMMONIA REDUCTION OF NITRIC OXIDE. *(Anmonia ni yoru NO kangen hanno ni okeru kyoson gasu no eikyo). Text in Japanese. Preprint, Catalytic Society of Japan, Sendai, p. 108-109, 1974. (Presented at the Symposium on Catalysts, 35th, Sendai, Japan, Oct. 4-5, 1974, Paper 4T04.)*

Effects of oxygen, water, and sulfur dioxide were investigated on the reduction of nitric oxide by ammonia, using vanadium pentoxide catalyst on alumina carrier. The presence of O2 becomes necessary when NH3 is used as reducing agent. With the mixture of NO-NH3-O2 gases, a 95% removal of NO occurs at 300 C, but removal of oxygen decreases the rate to 20%. When water is added to the NO-NH3-O2 system, nitrous oxide is formed, and the NO removal percentage decreases. The decrease also occurs in the presence of SO2 and H2O. The role of SO2 is to suppress the combustion of NH3 on the catalyst. When SO2 is added to the NO- NH3-O2 system, with or without the presence of water, the rate of removal of NO decreases at low temperature but the temperature range maintaining a high removal rate increases. The energy of activation for the NO-NH3-O2 system between 200-240 C was 6.3 kcal/mol.

45164 **APTIC NO. 65417**

Tyczkowski, Edward A.

SYNTHESIS OF TRIFLUOROMETHYLSULFUR PENTAFLUORIDE (CF3SF5). *Armageddon Chemical Co., Environmental Protection Agency Contract 68-02-0680, Proj. FY 72, Program Element 1AA010, Rept. EPA-650/4-74-010, 13p., April, 1974. 12 refs.*

NTIS: PB233149/AS

A quantity of 100 lbs of trifluoromethylsulfur pentafluoride (CF3SF5) was prepared and tested to determine its potential as a meteorological tracer. The gas was delivered in lots of 10 lbs more or less and met certain quality requirements according to thermal conductivity gas chromatographic analysis. In producing the gas every possible precaution to minimize the release of CF3SF5 to the atmosphere was made. The CF3SF5 was prepared by the cobalt trifluoride fluorination of bis(trifluoromethyl)disulfide (CF3SSCF3). It was purified by alkaline sulfite scrubbing and fractional distillation to meet the quality requirements. About 2 lbs were lost to the atmosphere due to a leaking cylinder valve. Otherwise, there were no losses of any consequence. (Author summary).

45165 **APTIC NO. 68244**

Wakamiya, Masayuki, Jun Yagi, Yoshiharu Maesawa,
Harutoki Nakamura, Kyoichi Nagata, and Tominaga Keii

CLEANING OF AUTOMOTIVE EXHAUST GAS BY A CATALYST UTILIZING SILICA CLOTH AS A CARRIER (REPORT NO. 3), OXIDATION OF CO. *(Shirika kurosu wo tantai to suru shokubai ni yoru jidosha haigasu joka (Dai-3-ho)--CO no sanka hanno--). Text in Japanese. Preprint, Catalytic Society of Japan, Sendai, p. 114-115, 1974. 3 refs. (Presented at the Symposium on Catalysts, 35th, Sendai, Japan, Oct. 4-5, 1974, Paper 4T07.)*

The efficacy and mechanism of carbon monoxide oxidation by platinum catalyst, using silica cloth as carrier, were investigated. A mixture of CO, nitrogen, and oxygen was passed through 25 sheets of catalyst cloth. The CO concentration after treatment was measured with a non-dispersive infrared meter. The presence of 0.2% Pt on the carrier resulted in optimum catalysis, but the permanence of this Pt concentration is a problem. The activation energy for the reaction between O2 and CO was calculated to be 15.2 kcal/mol (160-210 C), and agreed with previously published data. By using palladium instead of Pt, an activation energy of 28.1 kcal/mol was determined. Carbon monoxide oxidation probably occurs through the same mechanism for both Pd and Pt.

45166 **APTIC NO. 65445**

Waldman, C. H., R. P. Wilson, Jr., and K. L. Maloney

KINETIC MECHANISM OF METHANE/AIR COMBUSTION WITH POLLUTANT FORMATION (FINAL REPORT). *Ultrasystems, Inc., Irvine, Calif., Environmental Protection Agency Contract 68-02-0270, Program Element 1AB014, ROAP 21ADG-10, Rept. EPA-650/2-74-045, 102p., June 1974. 77 refs.*

NTIS: PB 234149/AS

A large set of chemical reactions describing methane/air combustion was evaluated to determine the significant reactions at atmospheric pressure, 1500-2500 K, and equivalence ratio in the range of 0.8-1.25. The reactions were screened to eliminate reactions whose net contribution to heat evolution or pollutant formation was negligible, to eliminate species which had no discernible effect on either major species or temperature, and to eliminate groups of reactions constituting only species exchange loops. A set of 26 reactions/17 species was derived which can duplicate to + or - 5% of the predictions of the 134 reaction/25 species master set. Ten additional pyrolysis reactions are cited for low-temperature and fuel-rich applications. The Zeldovich mechanism is the principal route to nitric oxide for stoichiometric combustion, but under lean conditions a path to NO involving nitrous oxide is also active. For fuel-rich conditions, comparison with stirred reactor data suggest that NO formation cannot be explained by the Zeldovich mechanism alone, and an alternate path involving species of the type RN may be important. Finally, prompt NO arising from O-atom overshoot was not predicted for an idealized plug flow ignition case. (Author abstract)

45167 **APTIC NO. 68245**

Yagi, Jun, Yoshiharu Maesawa, Masayuki Wakamiya,
Harutoki Nakamura, Kyoichi Nagata, and Tominaga Keii

CLEANING OF AUTOMOTIVE EXHAUST GAS BY A CATALYST UTILIZING SILICA CLOTH AS A CARRIER (REPORT NO. 4), COMPLETE OXIDATION OF HYDROCARBONS. *(Shirika kurosu wo tantai to suru shokubai ni yoru jidosha haiki gasu joka (Dai-4-ho)--Tanka suiso no kanzen sanka--). Text in Japanese. Preprint, Catalytic Society of Japan, Sendai, p. 116-117, 1974. 2 refs. (Presented at the Symposium on Catalysts, 35th, Sendai, Japan, Oct. 4-5, 1974, Paper 4T08.)*

The complete oxidation reaction of representative paraffins, olefins, and aromatic hydrocarbons in automotive exhaust gases, with platinum catalyst on silica cloth carrier was investigated. Reaction begins at low temperatures (about 150 C), but the behavior differs depending on whether a mixture of these three types of hydrocarbons or a single type of hydrocarbon is present. Olefins, in particular, exhibit anomalous behavior, indicative of competing adsorption by paraffins and aromatics. The activation energy (17.0 kcal/mol) for the catalytic oxidation of n-C6H14 was calculated from the equation where thermal equilibrium is assumed to be established on the catalyst surface. This figure agrees with previous data for the catalytic oxidation of hydrocarbons, and indicates the applicability of this reaction model.

45168 **APTIC NO. 68247**

Yamada, Hironori, Haruo Kuronuma, and Hisao Imai

ADSORPTION OF CO AND NO ONTO NIY TYPE ZEOLITE. *(NiY gata zeoraito e no CO oyobi NO no kyuchaku). Text in Japanese. Preprint, Catalytic Society of Japan, Sendai, p. 176-177, 1974. (Presented at the Symposium on Catalysts, 35th, Sendai, Japan, Oct. 4-5, 1974, Paper 4U02.)*

Two gases (carbon monoxide and nitric oxide), whose adsorption characteristics differ, were used in adsorption experiments on NiHY type synthetic zeolite of various exchange rates. By determining chemical adsorption values, the distribution of nickel (+2) cation sites, in particular with respect to S(II) and S(II prime), was investigated. The chemical adsorption values for CO were determined at 25 C. The chemical adsorption values for NO were determined at 0 C. It is inferred from the results that CO is chemically adsorbed onto the Ni(+2) distributed on site S(II), whereas NO is chemically adsorbed onto Ni(+2) distributed at sites S(II) and S(II prime).

45169 **APTIC NO. 65421**

Yao, H. C. and M. Shelef

NITRIC OXIDE AND CARBON MONOXIDE CHEMISORPTION ON COBALT-CONTAINING SPINELS. *Preprint, Ford Motor Co., Dearborn, Mich., Scientific Research Staff, 30p., May 29, 1974. 30 refs.*

The chemisorption of nitric oxide and carbon monoxide was investigated on cobalto-cobaltic oxide (Co3O4) and other cobalts containing normal spinels such as cobalt aluminate (cobalt blue-CoAl2O4) and zinc-cobalt oxide (ZnCo2O4). On Co3O4 the chemisorption on NO and CO is very similar, with that of the NO stronger. Monolayer coverage by NO at 25 C is attained at 500 torr and by CO at 1000 torr. The NO can coadsorb on a surface covered with preadsorbed CO. Preadsorption of NO prevents the co- adsorption of CO. The uptake of NO and CO by ZnCo2O4 is the same as by Co3O4. The CoAl2O4 is almost totally inert for the adsorption. The divalent cobalt ions in CoAl2O4 were found by ion-scattering spectroscopy to be largely shielded from the surface. Chemisorption of CO on two crystallographic modifications of cobaltous oxide showed that the CoO with the sodium chloride structure is active in chemisorption, while the modification having the zinc sulfide structure is not. The tetrahedral co-ordination of the cobaltous ions in CoAl2O4 is responsible for their inactivity in chemisorption rather than their oxidation state. (Author abstract modified)

1973

45170 **APTIC NO. 65464**

Cassidy, John F., Jr.

ON THE USE OF A COMPUTER CONTROLLED ENGINE DYNAMOMETER FOR THE DEVELOPMENT OF AUTOMOTIVE ELECTRONICS. *General Motors Corp., Warren, Mich., Electronics and Instrumentation Dept., Research Pub. GMR-1425, 39p., July 17, 1973. 7 refs. (Presented at the International Symposium on Automation of Engine and Emission Testing, 2nd, London, England, Sept. 28, 1973.)*

A computer controlled engine dynamometer was designed for the development of automotive powerplant control electronics.

It includes a minicomputer with a real time control and data acquisition capabilities, a large process control computer, and a scientific data processing computer. The minicomputer controls the engine and dynamometer to duplicate in-vehicle performance and simulates proposed electronic systems. This allows functions and parameters to be specified with all the flexibility of a computer program and minimizes the need to build up preliminary hardware prototypes. Data from an exhaust emission correlation study duplicated that obtained from U. S. Federal vehicular test procedures on a chassis dynamometer. A study on stoichiometric control of air-fuel ratio demonstrated the capability of the minicomputer to duplicate the behavior of prototype electronic hardware. The ability to analyze the transient behavior of a system with a large number of variables and to focus on a few variables suitable for closed loop control was determined. (Author summary modified)

45171 **APTIC NO. 65296**

Castleman, A. W., Jr.

CHEMICAL REACTIONS AND NUCLEATING PROCESSES. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 52-53, Aug. 1973. 10 refs. (Complete text not available through APTIC.)*

Atmospheric ions are comprised of polar molecules clustered about a monovalent central ion. These ions are of importance to the electrical properties of the atmosphere and, under certain conditions, they may serve as prenucleation embryos in the process of heteromolecular nucleation. The nature of these ions, including their stability and participation in chemical reactions, is intimately related to their thermodynamic properties and structure. Ion cluster reaction studies are under way to provide the requisite thermodynamic data for establishing the importance of the nature of the central ion in stabilizing the cluster. Bond energy measurements were made for the clustering of water molecules about the radon progeny ions bismuth(+) and lead(+) and for water and sulfur dioxide about nitric oxide(+) and H3O(+). The radon progeny ion clusters of comparable sizes have similar stabilities. However, the measured bond energies of these ion clusters are larger than theoretical values calculated solely from electrostatic bonding considerations. (Author abstract)

45172 **APTIC NO. 65285**

Cox, R. A.

PHOTOCHEMICAL FORMATION OF SULFURIC ACID AEROSOL. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 28, Aug. 1973. 5 refs. (Complete text not available through APTIC.)*

Experimental results relating to the oxidation of atmospheric sulfur dioxide under the influence of sunlight are presented. The rate and mechanism of the photooxidation of SO2 resulting from light absorption by SO2 itself in the 300-330 nm region and of the oxidation of SO2 resulting from the involvement of reactive intermediates (specifically ozone) which are produced in polluted atmospheres as a result of photochemical reactions involving nitrogen dioxide and olefinic hydrocarbons are discussed. The rate of the photooxidation of SO2 resulting from light absorption by SO2 is very slow (0.02% SO2 oxidized/hr). The rate of oxidation of SO2 resulting from the involvement of reactive intermediates depends very much on the prevailing concentrations of ozone and olefins. In polluted air, SO2 may be oxidized at a rate of 1-10%/hr by this process. Some evidence for the photochemical oxidation of SO2 to sulfuric acid by the second process in the atmosphere over Southern England is presented. (Author abstract modified)

45173 **APTIC NO. 65346**

Diamant, W.

RELATIONSHIP BETWEEN THE COMBUSTION OF DISPERSED LIQUID FUEL DROPLETS AND THE FORMATION OF UNBURNED SOLID PARTICLES. *Beckman Instruments Process S.A., Geneva (Switzerland), Proc. Int. Symp. Environ. Meas., Geneva, Switzerland, 1973, p. 113-121. (Oct. 2-4.)*

An optical study of the dispersion of liquid fuels is described. The study demonstrated experimentally the incidence of certain physico-chemical parameters at the combustion level of dispersed liquid fuel droplets on the concentration of unburned solid particles inside the flue designed to carry off reaction products. Optical studies were conducted within the scope of combustion induced by a traditional burner-boiler combination. First, the atomized liquid fuels were minutely analyzed, and then downstream the combustion gases were examined with an ultramicroscope in a flue leading to a chimney. A well-defined optical image of the two forms of aerosol were obtained which could be held for any desired length of time. The theoretical and experimental results are discussed. (Author introduction modified)

45174 **APTIC NO. 65738**

Kasaoka, Narumitsu, Yusaku Sakata, and Masato Ikeda

REACTIVITIES OF METAL OXIDES MIXTURES WITH SULFUR OXIDES AND THEIR DECOMPOSITION REGENERATION REACTIVITIES FROM THE PRODUCED SULFATE SALTS. *(Io sankabutsu-fukugo kinzoku sankabutsu kan no hannosokudo to seiseiryusanen no bunkai-saiseisokudo). Text in Japanese. Preprint, Japan Society of Chemical Engineers, Tokyo, p. 113-114, 1973. 3 refs. (Presented at the Japan Society of Chemical Engineers. Fall Meeting, 7th, Nagoya, Japan, Oct. 13-16, 1973.)*

To develop a dry sulfurization method using the reaction of metal oxides with sulfur oxides, the regenerative and decompositional reactivities of sulfur dioxide and the sulfate salts of mixed oxides of copper, cobalt, manganese, iron and aluminum were studied at 350-650 C with 0.5% of SO2, 0.25% of oxygen and 0-4% water to find the optimum mixing ratio of metal oxides for removal os SOx. The sample was prepared from the coprecipitation of metal sulfates by sodium hydroxide which was calcined at 550- 650 C. The reactivities of the first run and in the second run after decompositive regeneration of sulfates produced in the first run were compared. The CuO-Fe2O3-Nl2O3 system surpassed the CuO-Fe2O3 and CuO-Al2O3 systems in regenerativity and the ratio of 25-50-25 mol% was most efficient, although its initial reactivity with SO2 was rather slow. The Co304-Al2O3-Fe2O3 and Mn2O3-Fe2O3-Al2O3 systems showed little or no reactivity.

45175 **APTIC NO. 65297**

Pueschel, R.

OCEANIC AEROSOLS: PHYSICAL-CHEMICAL PROPERTIES AND CLIMATIC EFFECTS. *In: Stockholm Tropospheric Aerosol Seminar. Stockholm Univ. (Sweden), Inst. of Meteorology, Rept. AP-14, Rept. 1973-05-28, p. 54-55, Aug. 1973. 8 refs. (Complete text not available through APTIC.)*

Organic vapors from the sea are emitted into the air during the bursting bubble process. Once airborne, these vapors participate in photochemical reactions forming aerosols in the presence of oxidants and ultraviolet light. In a laboratory experiment, the irradiation of the marine aerosol with an intensity of 3.2 times 10 to the 20th power quanta per second of 7.8 times 10 to the -12th ergs each increased the Aitken nuclei concentration by a factor of 20 and raised the aerosol mass by 20%. Extrapolated to the world s ocean area, the resulting annual production rate was 8 times 10 to the 6th tons or 4% of the production of reactive hydrocarbons from tree foliage sources and human activities. Although sea smog does not appear to present a problem on the global scale, its rate of formation depends on the number and energy of reacting protons and the available oxidant concentration. It could account for part of the 90% of the oceanic aerosol which is not sea salt, be responsible for temporal fluctuations of the Aitken nuclei over the oceans, and could affect the regional active nuclei budget.

The inert character of the organic portion of the marine aerosol leads to increased atmospheric retainment factors and greater potential effects on the earth s climate. Retarded droplet growth on sea salt nuclei was observed on several occasions and was related to the organic content in sea water. Puget Sound and offshore Atlantic sea salt retardation, for example, led to temperature reductions of 1 C due to a reduced amount of latent heat with implications for cloud development and stability. Numerous satellite photographs show anomalous cloud lines in the form of smoke plumes of up to 10,000 sq km area. They occur predominantly over ocean currents off the coasts of North America and East Asia, last up to 4 days, and can increase cloudiness by up to 4%. A hypothesis is proposed that they are caused by aerosols and water from the exhaust of ship power plants leading to condensation which otherwise is retarded due to deactivated or depleted natural nuclei.

45176 **APTIC NO. 65661**

Saiki, K., H. Shibahara, H. Inoue, and H. Oshima

REACTION OVER ANODIC OXIDIZED ALUMINUM-NOBLE METAL CATALYSTS-- OXIDATION OF CO AND REDUCTION OF NO. *(Yokyoku sanka aruminiumu-kikinzoku shokubai niyoru hanno--CO no sanka oyobi NO no kangen). Text in Japanese. Preprint, Japan Chemical Society, Tokyo, p. 128-129, 1973. 3 refs. (Presented at the Symposium on Catalysis, 33rd, Hiroshima, Japan, Oct. 10-11, 1973.)*

An anodic oxidized aluminum plate was used to support noble metals (platinum, palladium, and ruthenium and transition metals (iron and nickel and oxidation of carbon monoxide and reduction of nitric oxide by CO were studied. Electroplating, vapor deposition, and dipping were used to incorporate the metals onto the anodic oxidized aluminum plates. The electroplated Pt catalyst was the most active for oxidation and reduction. The anodic oxidized aluminum layer is porous gamma-alumina, having a mean pore radius of 40 A and depth of 18 micron. The electroplated Pt-anodix oxidized aluminum catalyst had a specific area of 550 sq cm/sq cm, and assuming a density of the oxidized layer to be 3 g/cu cm, the layer would correspond to an alumina of 10 sq m/g. Pore density and diameter can be controlled for the anodic oxidized aluminum by adjusting types, concentration, temperature, and current density of the anodic oxidizing bath. At a bath temperature of 45 C, an effective surface area of the anodic oxidized aluminum was far larger than that at 20 C. This agreed with the catalytic activity result obtained as a function of anodic oxidizing temperature. During electroplating, metallic ions diffuse into the pores of the anodic oxidized aluminum and are supported at the bottom of the pores. Therefore, as the grand total of the bottom area of the pores becomes larger, the catalyst becomes more active because of its larger effective surface area.

1972

45177 **APTIC NO. 65013**

Etablissement d Etudes et de Recherches
Meterologiques/CREI/TBC Magny-les Hameaux
Observatory (France)

NOTES ON THE CAPABILITIES AND LIMITATIONS OF SIMILARITY METHODS FOR AIR POLLUTION STUDIES. *(Notes relatives aux possibilities et aux limites des methodes de similitude pour des etudes de pollution atmospherique). 21p., 1972 (?). Translated from French, 21p.*

The capabilities and limitations of simulation in a wind tunnel or in a hydraulic tunnel are reviewed. The limits on the validity of flow and dye-marker studies is emphasized. A general orientation for experimental research is provided with the view of determining the proper areas for application of these methods. The criteria for similarity in simulation are reviewed, and the theoretical basis is discussed. Different experimental methods, the flows, the measurements, the time factor, and the simulation of particular phenomena (temperature inversions, local thermal effects, fallout, variations in wind direction, and emissions) are discussed. Physical models in air or in water can be suitable for the study of air pollution in certain cases, but the methods are valid only if certain exact conditions are satisfied. The methods are difficult to apply to any case, and the risk of error is great.

1961

45178 **APTIC NO. 65009**

Meyer zu Reckendorf, Wolfgang and William A. Bonner

A SYNTHESIS OF THE ANOMERS OF 4,6-BENZAL-METHYL-D-GLUCOSAMINIDE THROUGH DERIVATIVES OF N-FORMYL-D-GLUCOSAMINE. *(Eine Synthese der Anomeren des 4,6-Benzal-methyl-D-glucosaminids ueber Derivate des N-Formyl-D-glucosamins). Chem. Ber., 94(12):3293-3297, 1961. 15 refs. Translated from German, 10p.*

The anomers of 4,6-benzal-methyl-D-glucosaminide were synthesized by benzylidation and glycosidation of the N-formyl-D-glucosamine and by alkaline hydrolysis of the N-formyl group. The experiments and chemical reactions are described. (Author abstract modified)

EFFECTS-HUMAN HEALTH

1974

45179 **APTIC NO. 65040**

Aerts, C., C. Voisin, and M. C. Maes

TECHNIQUE FOR IN VITRO STUDY OF THE BACTERICIDAL CAPABILITY OF GUINEA PIG ALVEOLAR MACROPHAGES. *Pasteur Inst., Lille (France), Inst. National de la Sante et de la Recherche Medicale and Commission of European Assoc. Contract, 1974 (?). 12 refs. Translated from French, 10p.*

One of the essential functions of alveolar macrophages is the destruction of microorganisms entering the respiratory apparatus through inhalation. Although bactericidal activity may be demonstrated in vivo, such methods are poorly suited for quantitative analysis of the bactericidal capability of phagocytes; therefore an in vitro bactericidal test was developed using guinea pig alveolar macrophages. The equipment and techniques for this method are reviewed, and results of a bactericidal activity test made using the technique are described. The relatively slow rate of phagocytosis of the bacteria caused the introduction of two factors which must be taken into account in any evaluation of the results: the parallel development of killing and phagocytosis of new bacteria by the macrophage cells, making it difficult to interpret the isolated bacteria count at any given moment; and the rapid increase in nonphagocytic bacteria in the survival medium. These two factors undoubtedly contain an explanation for the divergent viewpoints given in the literature on the in vitro antibacterial activity of alveolar macrophages, and the large number of techniques proposed so far.

45180 **APTIC NO. 65694**

Antal, Al, Aurelia Coasan, T. Vicas, I. Balasoiu, V. Horvath, and Silvia Sabau

DYNAMICS OF THE HEALTH STATUS OF CHILDREN IN AN AREA WITH ATMOSPHERIC POLLUTION, AS COMPARED WITH A CONTROL GROUP. *(Dinamica starii de sanatate a copiilor, dintr-o zona cu poluare atmosferica in comparatie cu un lot martor). Text in Rumanian. Igiena (Bucharest), 23(4):229-236, 1974. 13 refs.*

The effect of air pollution on children was studied in two areas of Romania. Development, psychometric aspects, and morphological aspects were studied. Vital capacity, maximum expiratory volume, and muscular strength were examined. Adaptability and learning performance were studied in children from 7 to 14 years old. In polluted areas containing high concentrations of nitrogen oxides, sulfur dioxide, lead, and carbon black, the health of the children was impaired. Respiratory diseases were frequent, and pleurobronchopulmonary diseases, anemia, and rachitis also occurred. Scholarly performance was poorer in polluted areas than in control areas. Children in polluted areas were also shorter than in control areas.

45181 **APTIC NO. 65606**

Balazs, Tibor

DEVELOPMENT OF TISSUE RESISTANCE TO TOXIC EFFECTS OF CHEMICALS. *Toxicology (Netherlands), 2(3):247-255, 1974. 32 refs.*

Evidence is presented from published literature and experiments that after repeated administration of various chemicals which induce degenerative changes, resistance develops in the target tissue to toxic effects. Such a resistance develops only after an induced lesion, and it is not specific to the inducing agent, but extends to agents causing similar lesions. The resistance lasts during the period of exposure to the noxious agent and for varying times thereafter. It is an adaptation mechanism to the adverse environment, and thus it is of epidemiological interest. This phenomenon is of significance in the study of chemical safety. The present practice of performing histopathology examinations solely in prolonged dosing studies may overlook what happened in the early stages of exposure to potentially toxic agents. The resistance is also of clinical interest, since the toxic effect may not manifest itself in long-term therapy, even though the pharmacologic effect does not diminish. The continuing pharmacologic effect implies that the phenomenon is not related to a pharmacokinetic change. Apart from this, its mechanism has not been established. Substances which show this effect include mercury salts, sodium maleate, aspirin, phosphorus ozone, nitrogen dioxide, phosgene, and nitrogen dioxide. This adaptation mechanism is important in studies of air pollution, because some studies have shown more pronounced acute effects of air pollutants in visitors than among inhabitants of the polluted areas. (Author summary modified)

45182 **APTIC NO. 68115**

Chujo, E. and T. Shibasaki

EFFECTS OF AIR POLLUTION ON THE HEALTH OF REGIONAL INHABITANTS, PART III. *(Taiki osen ga chiiki jumin no kenko ni oyobosu eikyo ni tsuite, dai 3po). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 21(10):420, Oct. 1974. (Presented at the Japanese Society of Public Health Annual Meeting, 33rd, Fukushima, Japan, Oct. 16-18, 1974, Paper 550.)*

Ventilatory function tests were carried out on 120 inhabitants of the Fukushima Ward of Osaka City who complained of continued cough and sputum. The subjects were 56 males and 66 females, including those who have lived in the ward for more than 10 yrs and including 25 males and 20 females older than 60. The percentages of those showing obstructive disturbances, restrictive disturbances, and a mixed-type of disturbance were, respectively, 5.0, 22.5 and 7.5. When limited to the persons who live along the national road, the percentages were respectively, 9.1, 13.6 and 13.6, showing a tendency towards a larger morbidity of respiratory disturbances.

45183 **APTIC NO. 68117**

Chujo, E. and T. Uemura

EFFECTS OF AIR POLLUTION ON THE HEALTH OF REGIONAL INHABITANTS, PART II. *(Taiki osen ga chiiki jumin no kenko ni oyobosu eikyo ni tsuite, dai 2ho). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 21(10):419, Oct. 1974. (Presented at the Japanese Society of Public Health Annual Meeting, 33rd, Fukushima, Japan, Oct. 16-18, 1974, Paper 549.)*

Based on answers to questionnaires of 1972 which showed the percent of people in the Ebie-western region who claimed continued cough and sputum was 13.5, which is higher than the average of 10.2 in the Fukushima Ward, a further investigation was carried out on 136 persons living in Ebie-western region for more than 3 years. The age distribution was 5.1% in their fifties, 4.0% in their sixties, 3.1% in their forties, and 1.0% below 30. The following results were found: the percentage of persons claiming cough and sputum was 14.0; the % of persons living in the area for more than 10 yr was 15.8; disturbed respiratory functions were found in 16.3% of the men and in 14.4% of the women; and disturbed respiratory functions occurred more frequently in smokers than in non-smokers. There was no difference in the complaints of cough and sputum between 1972 and 1973; however, the number of persons with disturbed respiratory functions increased slightly from 1972 to 1973.

45184 **APTIC NO. 68112**

Hasegawa, M., M. Kumagai, T. Aikawa, M. Ueda, and K. Kameyama

ON THE RESULTS OF SPUTUM-EXAMINATION AS INDICES OF AIR POLLUTION. *(Taiki osen shihyo to shiteno kattan kensa seiseki ni tsuite). Text in Japanese. Hokkaido-ritsu Eisei Kenkyushoho, no. 24:97-103, June 1974. 5 refs.*

Bacteria in the sputum of patients of chronic bronchitis who live in the air polluted areas of two cities, Otaru (polluted by auto exhaust) and Muroran (polluted by industrial exhaust) and in non-polluted areas of the two cities was examined three times from Sept. 1972 to Jan. 1973. The bacterial species most frequently identified were alpha-hemolytic Streptococcus, nonhemolytic Streptococcus and Neisseria, and there was no difference of species of bacteria and their quantity between the areas. According to the sputum examination utilizing the measurement of coal dust as an index, no clear difference was found between the polluted and non-polluted areas of Muroran City.

45185 **APTIC NO. 65554**

Hysell, David K., Wellington Moore, Jr., Myron Malanchuk, Lucille Garner, Robert G. Hinners, and Jerry F. Stara

COMPARISON OF BIOLOGICAL EFFECTS IN LABORATORY ANIMALS OF EXPOSURE TO AUTOMOTIVE EMISSIONS EMITTED WITH AND WITHOUT THE USE OF CATALYTIC CONVERTER. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1974. 5 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-219.)*

The biological effects in rats and hamsters of exposure to exhaust emissions from a 1973 Chevrolet 350 CID production engine equipped either with or without a noble metal pelletized type oxidation catalytic converter were investigated. Catalytic action reduced carbon monoxide and the total hydrocarbon concentration by 85-90%. The levels of nitric oxide were nearly the same except for the lower concentration in the irradiated noncatalytic exposed exhaust. The animals were held in stainless steel exposure chambers and exposed continuously for 7 days to one of the following atmospheres: catalytic-treated irradiated exhaust; catalytic-treated nonirradiated exhaust; irradiated exhaust; nonirradiated exhaust; CO control atmosphere; and CBR filtered air control atmosphere. Extensive histopathological lesions appeared in adult animals and a significant mortality rate was observed in suckling rats exposed to the non-catalytically treated exhaust. The greatest mortality in the suckling rats occurred in the exposure to noncatalytically treated irradiated exhaust. The effect was not due to the levels of CO. No significant pathological lesions were found in animals exposed to the exhausts that had been passed through the converter. (Author abstract modified)

45186 **APTIC NO. 65602**

Inerbayeva, G. S., R. Isabekova, and B. A. Nemenko

MORPHOLOGICAL CHANGES IN RAT LUNGS DUE TO INHALATION OF AMMONIUM AND SODIUM DICHROMATE DUSTS. *(Morfologicheskiye izmeneniya v legkikh krys ot vozdeystviya pyli bikhromatov ammonia i natriya). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, no. 6:48-49, 1974.*

Morphological changes in the lungs of rats exposed to 1 mg/cu m of ammonium or sodium dichromate dust for 2 hr each three times a week were studied in a 6-month experiment. In the group exposed to ammonium dichromate, two animals died during the 1st month of the experiment, and all but three of the 36 animals died within 6 months. Edema in the perivascular and peribronchial tissues; disturbances in pulmonary circulation; desquamative and purulent bronchitis; and desquamative, interstitial, and abscessed pneumonia were detected upon autopsy. These changes were more pronounced in the group exposed to ammonium dichromate than in that exposed to sodium dichromate. In the former group of 36 animals, proliferation of the bronchial epithelium was observed in 24 cases, and desquamation of the epithelial proliferation in four cases. The prevalent steadiness of the proliferation, and the diffûse nature of the proliferation are indicative of the precancerous nature of these proliferations.

45187 **APTIC NO. 68119**

Kavet, Robert I. and Joseph D. Brain

REACTION OF THE LUNG TO AIR POLLUTANT EXPOSURE. *Life Sci., 15(5):849-861, Sept. 1, 1974. 53 refs.*

Epidemiological and laboratory studies of the effects of various air pollutants on the lung are reviewed. Urban air pollutants, when administered to laboratory animals, adversely affect pulmonary structure and function. Effects include decrease in airway caliber, changes in lung elasticity, degeneration or destruction of tissue, and impaired pulmonary defense mechanisms. Urban dwellers subjected to pollutant exposures might incur similar health risks. The substances reviewed are: reducing pollutants such as sulfur dioxide and associated particulates; and oxidizing (or photochemical) pollutants such as nitrogen dioxide and ozone. Epidemiological studies have shown that high pollutant levels in both reducing and oxidizing environments can produce exacerbating effects on pre-existing respiratory conditions. However, evidence implicating photochemical pollutants as an initiator of increased human morbidity or mortality is still lacking. Photochemical oxidants interfere with athletic performance and produce sensory irritation. Environmental exposure to SO2 and particulates has been associated with impairment of pulmonary function and increased prevalence of chronic bronchitis and increased incidence of acute respiratory disease. Environmental controls can help alleviate respiratory symptoms, prevent further lung injury, and allow healing processes to return damaged tissue toward a more normal state. (Author summary modified)

45188 **APTIC NO. 65604**

Koller, Loren D. and Sharlotte Kovacic

DECREASED ANTIBODY FORMATION IN MICE EXPOSED TO LEAD. *Nature (London), 250(5462):148-150, July 12, 1974. 16 refs.*

Swiss Webster mice were given 1375, 137.5, or 13.75 ppm lead acetate in deionized water for 56 days. The control group was given deionized water orally. There were 120 mice in each group The diet fed to all the mice was contaminated with 1.12 ppm lead. After 56 days, all mice were inoculated intraperitoneally with 0.2 ml of a 2% suspension of sheep red blood cells. Ten mice in each group were killed on days 3-7 to measure primary immune response (19S or IgM antibody) and on days 8-14 for the secondary response (7S or IgG antibody) after a second inoculation of sheep red blood cells while they remained on 137.5 ppm lead. The number of plaque forming cells were measuring in the spleen. Erythrocytes were observed for basophilic stippling, packed cell volume was measured, serum was collected for haemolysin titration, and kidneys were examined for lead. Chronic exposure to lead produced a significant decrease in antibody synthesis, particularly IgG, indicating that the memory cell was involved. The results also incidated that the reduced antibody synthesis was responsible for the increased mortality from bacterial and viral diseases in animals that were chronically exposed to lead. Other environmental contaminants such as polychlorinated biphenyls, cadmium, mercury, DDT, and sulfur dioxide have also resulted in reduction of circulating antibodies in animals, in other experiments.

45189 **APTIC NO. 65553**

Lee, S. D., Myron Malanchuk, and Vincent N. Finelli

BIOLOGICAL EFFECTS OF EMISSION FROM AN AUTOMOBILE ENGINE WITH AND WITHOUT CATALYTIC CONVERTER. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1974. 10 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-218.)*

The biological effects of emissions from an automobile engine with and without a catalytic converter were investigated. Groups of rats were exposed to diluted emissions from an automobile with and without a catalyst, and a comparative experiment was conducted by exposing rats to carbon monoxide alone (575 mg/cu m). The parameters measured were hematocrit, serum lactate dehydrogenase (LDH), serum glutamicoxaloacetate transminase (GOT), and serum lysozyme. An elevation in hematocrit was observed in animals of the experiment run without the catalyst and in those exposed to CO. The use of the catalyst reduced the CO levels in the exposure chambers more than 10-fold, and also prevented this bioeffect. Serum LDH activity was elevated in the groups of rats in the experiment conducted without the catalyst, but no alteration was observed in the animals from the experiment utilizing the catalyst or in those exposed to CO alone. (Author abstract modified)

45190 **APTIC NO. 65659**

Lyublina, Y. I. and L. V. Rabotnikova

COMPARATIVE ASSESSMENT OF THE ACUTE TOXICITY OF SOME BROMINE- CONTAINING HYDROCARBONS. *(Sravnitel naya otsenka ostroy toksichnosti nekotorykh bromuglevodorodov). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, no. 4:55-57, 1974. 6 refs.*

The acute oral, intraperitoneal, inhalatory, and percutaneous toxicity of 16 bromine-containing hydrocarbons (bromoform, isopropyl bromide, butyl bromide, isobutyl bromide amyl bromide, isoamyl bromide, hexyl bromide, heptyl bromide decyl bromide, bromobenzene, dibromobenzene, parabromotoluene, alpha-bromstyrene, alpha-bromonaphthalene, allyl bromide, and acetyl bromide) was studied in test animals. No pronounced correlation between the different parameters of toxicity as determined for the different routes of entry was established. Bromine-substituted alkyls were more toxic than chlorine- substituted ones, but less toxic than iodione-substituted alkyls. Exponential increase in the inhalatory toxicity with the increase in the number of the carbon atoms from 3 to 10, and an increase in the thermodynamic activity with such an increase from C3 to C7 were determined. Strong negative correlation with a factor of -0.85 between the inhalatory toxicity and the specific gravity was found. The LC50 values were 12.1 mg/l for bromoform, 36 mg/l for isopropyl bromide, 25.8 mg/l for butyl bromide, 50.5 mg/l for isobutyl bromide, 26.8 mg/l for hexyl bromide, 12 mg/l for heptyl bromide, 4.2 mg/l for decyl bromide, 14.4 mg/l for bromobenzene, 1.3 mg/l for parabromotoluene, 4.11 mg/l for alkyl bromide, and 48 mg/l for acetyl bromide.

45191 **APTIC NO. 65597**

Misiakiewicz, Zbigniew, Genowefa Szulinska, Andrzej Chyba, and Ewa Czyz.

THE EFFECT OF AIR POLLUTION WITH NITROGEN OXIDE ON EXPERIMENTAL ANIMALS UNDER CONDITIONS OF LONG-TERM CONTINUOUS EXPOSURE. *(Wplyw powietrza zanieczyszczonego dwutlenkiem azotu na zwierzeta doswiadczalne w warunkach dlugotrwalej ciaglej ekspozycji). Text in Polish. Roczinki Panstowego Zakladu Higi, 25(2):245-254, 1974.*

The action of nitric oxide in concentrations of 0.25 and 0.5 mg/cu m on 16 male Wistar rats was studied. Three groups of 8 rats each were used. The control group was placed in a chamber with a capacity of 150 l and a continuous air flow of approximately 30 l/min with no NO. The test groups were placed in chambers containing respectively 0.25 mg/cu m and 0.5 mg/cu m NO. The experiment lasted 6 months. Every 5 to 6 weeks the body weight increased, the activity of the blood cholinesterase, the activity of asparaginian blood serum aminotransferase, the activity of blood catalase, the hemoglobin cout, and histopathological changes were examined. Significant changes were observed in the group exposed to the 0.5 mg/cu m NO concentration after 170 days, among them changes in the lungs, changes of blood cholinesterase activity, asparaginian aminotranspherase of blood serum activity, and blood catalase activity. These changes are more pronounced in air polluted with a 0.5 mg/cu m NO concentration than in air with a 0.25 mg/cu m NO. The Polish standards for nitrogen oxides concentrations are too high, the highest concentration allowed in the atmospheric being 0.2 mg/cu m up to 0.6 mg/cu m for 20 min.

45192 **APTIC NO. 68090**

Mori, Akio

VARIOUS PROBLEMS IN THE TREATMENT OF AIR POLLUTION HEALTH DAMAGES - A SURVEY OF MEDICAL CARE AT THE MINATO CLINIC OVER THE LAST TWELVE MONTHS. *(Taiki osen yi yoru kenko shogai no chiryojo no sho mondai - kako ichinenkan ni okeru toshin kogaibyo kanja no iryo no jittai). Text in Japanese. Preprint, All Japan Democratic Union, p. 39, 1974. (All Japan Democratic Medical Union, Scientific Meeting, 2nd, Sendai, Japan, Oct. 26-27, 1974.)*

The South Nagoya Coastal Industrial belt is one of the most heavily polluted areas of Japan, and in the small, limited area officially recognized as heavily polluted district, already more than 3000 residents were designated as pollution victims. In the Minato Clinic, an average of 20-30 outpatients are victims of pollution in some form. The state of pollution victims is discussed with regard to their monthly examinations, complex diseases and recurrent diseases, medical costs, and recovery; light and intermediary patients are discussed as to their treatment guidances such as sputum discharge, exercises for asthmatic patients, improvement of health (reducing susceptibility), and observation and administration of patients.

45193 **APTIC NO. 65730**

Nakagawa, S., S. Gokyo, T. Nakagawa, T. Ishizaki, and Y. Ishimatsu

ON THE RELATIONSHIP BETWEEN AIRWAY DISEASES CENTERING AROUND ASTHMA AND AIR POLLUTION IN KITAKYUSHU CITY. *(Kitakyushu-shi ni okeru zensoku o chushin to shita kido-sei shikkan no taiki osen tono kankei ni tsuite). Text in Japanese. Koshu Eisei (Public Health), 38(3):182-195, March 1974. 14 refs.*

An epidemiological investigation on the health of 7856 factory workers in the highly air polluted city of Kitakyushu was carried out from April to Nov. 1972. The method consisted of questionnaires and statistical tables concerning air pollution made by the Municipal office. The whole city was divided into four areas following the degree of air pollution and the uniformity of subject groups was confirmed statistically. The results were summarized in each disease as follows: bronchial asthma and asthma-like diseases had a generally higher onset in more polluted areas, were accelerated by occupational pollution, had a higher onset in men than women, and increased with age in the group affected by air pollution; of those who complained of asthmatic symptoms, 54.2% showed actual bronchial asthma, 27.2% showed improved or cured asthma, and 4.8% showed a suspicion of asthma; air pollution and smoking did not affect the onset of allergic rhinitis which was more frequent in men than women, especially in younger men, and occupational pollution seemed to have accelerated the disease a little; infectious diseases were not affected much by pollution, smoking, sex, and occupation; and air and occupational pollution did not affect chronic bronchitis, but smoking and sex showed significant correlations to the disease and the correlation was more profound with age.

45194 **APTIC NO. 65571**

Ott, Wayne and David Mage

INTERPRETING URBAN CARBON MONOXIDE CONCENTRATIONS BY MEANS OF A COMPUTERIZED BLOOD COHB MODEL. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1974. 10 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-244.)*

A computer model for estimating the level of blood caboxyhemoglobin (percent COHb) as a function of time for measured carbon monoxide concentrations (ppm CO) was developed from data in a variety of published studies on the assimilation of CO into the blood of human subjects. The model was used to predict the effect upon blood COHb of CO concentrations measured continuously at an air monitoring station. Because U. S. CO air quality standards are designed to prevent the occurrence of 2% COHb, the model was used to examine the effectiveness of these standards in maintaining blood COHb below the 2% level. The model was applied to continuous CO data measured at an actual air monitoring station over the period of a year (8760 hourly values). The CO standards sometimes are violated without exceeding the percent COHb, as well as the converse: 2% COHb is exceeded without violation of the CO standards. The significance of these findings is discussed in detail. The model offers an effective means to routinely analyze CO concentrations measured at urban air monitoring stations, converting these values to predicted COHb levels on a continuous basis. (Author abstract)

45195 **APTIC NO. 64983**

Rytoemaa, Inkeri and Helena Tuompo

LEAD LEVELS IN DECIDUOUS TEETH. *Naturwissenschaften (Berlin), 61 (8):363, 1974. 7 refs.*

The lead content of deciduous teeth of children born and living in Helsinki and of children from Tervola, a suburban area in northern Finland, was studied. The material analyzed comprised a total of 136 intact deciduous teeth obtained from children born between 1958 and 1957. Enamel and dentine were separated by the flotation method. The lead complex was extracted into methyl-iso-butylketone and the concentration of lead complex was determined with a Perkin-Elmer 300 atomic absorption spectrophotometer. The average lead content for all teeth collected in Helsinki was 69.9 + or - 68.4 ppm in enamel and 0.71 + or - 0.82 ppm in dentine (mean plus S. D.). The respective values for teeth collected in Tervola were 81.4 + or - 44.6 ppm and 0.46 + or - 0.25 ppm. When the values are plotted against the birth year of the tooth donor, the lead contents of both enamel and dentine show a tendency to be elevated in Helsinki.

45196 **APTIC NO. 68108**

Seto, K., M. Kon, K. Haruhara, M. Kawakami, K. Sugita, and M. Shishido

INFLUENCE OF OZONE INHALATION ON THE PROTEIN PRODUCTION IN THE LUNG. *(Hai no tan-*

paku seisei ni taisuru ozon kyunyu no eikyo). Text in Japanese. Igaku to Seibutsugaku, 89(2):155-158, Aug. 1974. 6 refs.

The influence of ozone inhalation at concentrations of 0.15, 0.50 and 1.00 ppm for 1, 3, 168 and 336 hr, respectively on protein production, which was represented by the intake of 14C from L-leucine-u-14C into the protein of the surface active substance of a slice of rabbit lung, was studied. Inhalation of ozone at 0.15 ppm did not influence the intake of 14C from L-leucine-u-14C into the protein, regardless of the period of inhalation. A concentration of 0.50 ppm for 1, 3 and 168 hr did not influence the intake of 14C; however, expsoure for 336 hr caused a decrease in the intake of 14C. A concentration at 1.00 ppm for 1 and 3 hr did not influence the intake of 14C; however, exposure for 168 and 336 hr decreased the intake of 14C.

45197 **APTIC NO. 64966**

Shishido, M., K. Sugita, F. Higuchi, A. Ogihara, K. Abe, M. Orita, K. Komuro, and G. Komatsu

STUDIES ON PULMONARY FUNCTION BY FLOW-VOLUME CURVE -REPORT 1. COMPARISON BETWEEN PULMONARY FUNCTION OF THE FEMALE INHABITANTS IN KANAGAWA-WARD(KU) AND THOSE IN ISOGO-WARD(KU) OF YOKOHAMA CITY. *(Flow-Volume kyokusen ni yoru kokyu kino no kenkyu (dai Ipo) Yokohama-shi Kanagawa-ku to Isogo-ku no jumin no josei no kokyu kino no hikaku). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Publ. Health), 21(2):57-62, Feb. 1974. 12 refs.*

Pulmonary function by flow-volume curve was compared between 189 female inhabitants in Koyasu area of Kanagawa-ku and 213 female inhabitants in Isogo-ku, the dates of determination being 13 and 14 Feb. 1974 in Koyasu, and 10, 17, and 24 Feb. and 10, and 24 March 1974 in Isogo-ku. The annual average levels of aerial concentration of sulfur dioxide were 0.5-0.8 mg/100 sq cm/day in the Koyasu area and 0.3-0.5 mg/100 sq cm/day in Isogo-ku in 1972. The amount of dust fall in a factory near the Koyasu-area was 15.1 tons and that in Isogo-ku was 9.0-13.0 tons in 1970. The former area is in an industrial zone, the latter in an industrial and commercial zone. The maximal expiratory flow of V75, V50, V25, PEFR and the values, converted respectively into height (per meters), weight (per kilograms), and body surface area (per sq m), of Isogo-ku female inhabitants were higher than those of Koyasu female inhabitants. The differences between the two were statistically significant (expect for V75 converted into body surface area and V50) the values of V75/V25 and V50/V25 of Koyasu female inhabitants were significantly higher than those of Isogo female inhabitants. The values of percentage FVC (forced vital capacity) of Koyasu subjects were significantly lower than those of Isogo subjects in every age from 30 through 70 and in the total of all ages greater than 20 (the youngest). Forced expiratory volume percent in Koyasu subjects was higher than that in Isogo subjects, however, not significantly. The adoption of the method of flow-volume curve in the case of mass examination on respiratory function is expected.

45198 **APTIC NO. 65704**

Tamura, S. and K. Owada

MENTAL AND PHYSICAL DEVELOPMENT OF CHILDREN IN THE AIR-POLLUTED NISHI-YODOGAWAKU WARD OF OSAKA. *(Taiki osen chiku ni okeru yoji no shinshin hatsuiku). Text in Japanese. Koshu Eisei Joho (Public Health Inform.), 4(4):23, April 1974.*

The Nishi-yodogawa Ward was designated as an environmentally polluted area of Osaka in Feb. 1952, and 2739 officially appointed patients were examined for the influence of air pollution on mental and physical development in children and the infantal potential for nephritis and nephrosis. The subjects were 466 boys and 516 girls, including 77 boys and 46 girls from the polluted area with health defects. No differences in average height and body weight were recognized between asympotmatic and impaired children in the area; however, both the height and body weight of 3 year old children in the area were below the averaged values for whole country in 1970 suggesting the bad influence of air pollution on the physical development of younger children. A noticeable trend of nervousness and a slight inferiority of independence were observed in symptomatic children. Positive proteinurea was found in 18 children including two patients who were hospitalized. The morbidity of asthmatic bronchitis, bronchial asthma, and chronic bronchitis of appointed boys and girls were respectively, 60%, 40%; 61.9%, 38.1%; and 50%, 50%. The number of officially appointed children suffering from air pollution effects increased rapidly until June 1971; however, since then the increase has slowed, suggesting a decreased level of air pollution.

45199 **APTIC NO. 68116**

Ueda, M., N. Nakayama, Y. Tsunetoshi, E. Agata, T. Nakamura, M. Tsuda, and Y. Takemura

YEARLY CHANGE OF RESPIRATORY FUNCTION OF INHABITANTS IN GENERAL. *(Ippan jumin ni okeru kokyu kino no keinen henka). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 21(10):421, Oct. 1974. (Presented at the Japanese Society of Public Health Annual Meeting, 33rd, Fukushima, Japan, Oct. 16-18, 1974, Paper 551.)*

Investigations were carried out for 3 yrs on 263 inhabitants of a suburban district with air pollution levels of 0.04 ppm sulfur dioxide, 0.036 ppm nitric oxide, 0.066 ppm nitrogen dioxide, and 1.84 ppm carbon monoxide and on 399 inhabitants of a rural district with air pollutant levels of 0.01 ppm SO2, 0.017 ppm NO, 0.022 ppm NO2 and 0.5 ppm CO. Impairment of pulmonary functions decreased most in the group of chronic bronchitics who showed no marked change of symptoms during 3 yr; followed by the group with subjective symptoms of cough and sputum, and the group whose symptoms increased over 3 yr; and finally by the group without subjective symptoms and the group whose symptoms disappeared. The decrease of respiratory function of the group without subjective symptoms was the same as that of aging. After removing the smokers, the persons who have suffered respiratory diseases during the last 3 yr, and the persons who have visited physicians, the decrease of pulmonary function impairment was slightly larger in the rural area.

45200 **APTIC NO. 68124**

Vysochina, I. V., I. N. Konstatinova, L. F. Astakhova, and N. N. Skvortsova

ENERGY TURNOVER IN THE LUNGS OF SECOND-GENERATION RATS DUE TO COMBINED ACTION OF 2,3-BENZOPYRENE AND PHENOL. *(Energeticheskiy obmen v legkikh potomstva krys pri kombinorovannom deystvii 3,4-benzpirena i fenola). Text in Russian. Gigiena i Sanit., no. 8:93-95, 1974. 6 refs.*

The effect of phenol and 3,4-benzopyrene on energetic and metabolic processes in the lungs of exposed rats and their offspring was studied. The female rats were administered 5 mg 3,4-benzopyrene/mo intratracheally, and were permanently exposed to 0.4 mg phenol/cu m for 3 mo. A significant decrease in the fructose-1,6-diphosphate, and an increase in the lactic acid level in the lungs of the second generation from females exposed to phenol, and especially to phenol with 3,4-benzopyrene, were observed. The anaerobic glycolysis in lung hemogenates was intensified, and the aerobic glycolysis especially intensified under the combined effect of phenol and 3,4-benzopyrene. A potentiation of the effect of 3,4-benzopyrene on the pulmonary energetic processes by phenol was found, especially in the offspring, a fact which should be taken into account when establishing the maximum allowable 3,4-benzopyrene concentration in the air. The increased lung cancer morbidity may be partly due to the presence in the air of pollutants potentiating the carcinogenic action of other pollutants, such as 3,4-benzopyrene.

45201 **APTIC NO. 65478**

Wilson, Katherine W.

SURVEY OF EYE IRRITATION AND LACHRYMATION IN RELATION TO AIR POLLUTION (FINAL REPORT). *Copley International Corp., La Jolla, Calif., Coordinating Research Council, Inc. Contract CAPM-17-71(1-73), 69p., April 15, 1974. 95 refs.*

A survey on eye irritation and lachrymation in relationship to air pollution is summarized. It includes: chemical species responsible for irritation, mechanism of irritation, methods of measurement, and dose-response relationships. Eye irritation is produced when auto exhaust or hydrocarbon-nitrogen oxides mixtures are irradiated with near-ultraviolet light at approximately sunlight intensity. Eye irritation from auto exhaust is influenced by the olefin conten of the gasoline used as fuel and the ratio of hydrocarbons to NOx. Eye irritation from synthetic smog correlates reasonably well with measured levels of formaldehyde, acrolein, peroxyacetyl nitrate, and peroxybenzoyl nitrate. The latter compound presumably also exists in natural smog, but presently availablable methods are not sensitive enough to detect such low concentrations. Synthetic smog produced from auto exhaust is equally irritating when the fuel contains tetraethyl lead or is lead free. Neither sulfur dioxide at 1.5 ppm or ozone at 0.65 ppm contributes to eye irritation.

45202 **APTIC NO. 65747**

Yamaga, S., K. Omori, M. Oyashiki, K. Abe, T. Tozawa, K. Nakano, and F. Teranishi

THE EFFECTS OF REPEATED EXPOSURE OF EXPERIMENTAL ANIMALS TO NO2 AT LOW CONCENTRATIONS. *(Tei nodo nisanka chisso no hanpuku bakuro no eikyo). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 21(7):387-394, July 1974. 32 refs.*

An experimental study of the effects of repeated exposure of low concentrations of nitrogen dioxide on living bodies is described. When guinea pigs were exposed to 1 and 5 ppm of NO2, 3 hr/day, 6 days/wk for 90 days and 60 days, a significant increase of hemoglobin occurred only in the animals exposed to 5 ppm NO2. Rabbits were exposed to 2-3 ppm of NO2 5 hr/day, 6 days/wk for 85 days and no definite change attributable to this exposure was found on body weight, hematological parameters, and histopathological findings. No definite change of pulse rate was found on the rabbits which had been repeatedly exposed to 2-3 ppm of NO2, when they inhaled NO2; however, arrhythmia was noticed on three of four rabbits when they inhaled NO2 at 3, 10, and 30 ppm, respectively. The phenomenon appeared only after inhaling NO2 with no regularity. When other rabbits had been exposed to NO2 under the same conditions as above for 70 days, and on the 71st day inhaled 7-8 ppm of NO2, the pulse rates slightly increased and two rabbits showed arrhythmia. They showed normal respiration. The rabbits which had not been exposed to NO2 showed no arrhythmia when they inhaled NO2 at 3, 10, and 30 ppm, although they showed a tendency towards a decreased pulse rate. Rabbits which had been repeatedly exposed to NO2 showed a relatively strong response to adrenaline and acetylcholine.

45203 **APTIC NO. 64970**

Kanagawa Prefecture Environmental Center (Japan) and Kanagawa Prefectural Health Inst. (Japan)

STUDIES ON PHOTOCHEMICAL POLLUTANTS AFFECTING ANIMALS - THE EFFECTS OF ACROLEIN ON THE LIVING BODY. *(Dobutsu ni oyobosu kokagaku kogai genin busshitsu no kenkyu - Akurorein no seitai ni oyobosu eikyo). Text in Japanese. Kanagawa-ken Kogai Senta Nenpo (Annu. Rep. Kanagawa Pref. Environ. Cent.), no. 5:77, Feb. 1974.*

The effect of acrolein as a photochemical pollutant on animals was studied. Male and female dogs (5.5 to 11.2 kg) and rabbits (2.7 - 3.7 kg) were exposed to acrolein at a given concentration for 30 min. The acrolein concentration was determined by the M-aminophenol method. The electrocardiogram (II induction), heart beat, blood pressure, respiratory movement, and lens movement of the animals were examined. Acrolein produced a retarding effect on respiratory system, but it was insignificant at less than 5 ppm. Sharp increases of lens movement were observed at a concentration higher than 100 ppm, indicating a possibility that dogs and rabbits may have a strong resistance to acrolein.

45204 **APTIC NO. 65413**

HEALTH EFFECTS OF INCREASING SULFUR OXIDES EMISSIONS. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Office of Research and Development. 64p., July 1, 1974. 28 refs.*

The difficulties of meeting the pollution control standards as related to sulfur oxide emissions are discussed through the review of several topic questions. These include: control of sulfur oxides; changes in sulfur oxide the relationships linking sulfur dioxide to ambient levels of acid-sulfate aerosols; how growth in emissions from steam electric power plants alters human exposures to acid-sulfate aerosols; and the magnitude of the public health problem likely to follow a growth in emissions. Failure to control sulfur oxide emissions will result in thousands of excess deaths and millions of excess illnesses. Acid-sulfate aerosols represent a complex public health and regulatory problem. Control of sulfur oxide emissions from urban and rural power plants will be required massive conversion of urban power plants to high sulfur fuels and the use of tall stacks with supplementary control systems in rural power plants will greatly increase sulfate concentrations and endanger public health. Uncertainties in our scientific information base will foster major societal disagreements about the steps necessary to control the problem. Scientific uncertainties are being reduced by research programs but important information gaps will remain for five to ten years. (Author conclusions)

45205 **APTIC NO. 65662**

Kanto Regional Environmental Protection Headquarters (Japan), Air Pollution Section

THE STATUS QUO OF AIR POLLUTION CAUSED BY PHOTOCHEMICAL REACTION IN THE METROPOLIS AND THREE NEIGHBORING PREFECTURES. *(Itto sanken no okeru kokagaku hanno ni yoru taiki osen no genjo). Text in Japanese. In: Report of the 1973 Joint Survey on Photochemical Smog in Tokyo and Three Neighboring Prefectures. p. 7-28, April 1974. 4 refs.*

The health effects of photochemical smog in Tokyo and neighboring areas is described. The number of cases of smog-related diseases was 4/5 of the 1972 and 1/3 of the 1971 amounts in 1973. Numbers in Kanto and in Saitama decreased each year, those in Kanagawa increased a little in 1972, and those in Saitama increased each year. Days with high concentrations of oxidants in 1973 had high morbidity rates.

1973

45206 **APTIC NO. 65482**

Bailey, James A., Allen M. Jones, and Donald R. Roy

EFFECTS OF SILVER FROM CLOUD SEEDING ON MICROFLORA OF ANIMAL DIGESTIVE SYSTEM (FINAL REPORT). *Colorado State Univ., Denver, Dept. of Fishery and Wildlife Biology, Bureau of Reclamation, Div. of Atmospheric Water Resources Management Contract 14-06-D-7208, Rept. 14-06-D-7208, 38p., Sept. 1973. 129 refs.*

NTIS: PB 226062

Hazards of silver from weather modification to microorganisms of the rabbit cecum and goat rumen were evaluated. Rabbits eliminated 99% of an oral dose of silver iodide within 3 days and essentially all of the dose in an average of 6.3 days. Only 8-26% of the Ag entered the cecum. Chronic intake of AgI did not result in accumulation in the cecum, and there was no evidence of absorption from the tract. Digestion of a ration containing 4.2 ppm Ag as AgI and a ration containing 10 ppm Ag as silver nitrate was not affected by the metal. Synthesis of folic acid by cecal microflora was not reduced by 5 ppm Ag in the diet. In goats, a chronic intake of 1 ppm Ag did not produce accumulation in the rumen. Silver passed from the rumen with a half time of 1.3 days. Neither AgI simulating 1 ppm Ag in the diet nor silver nitrate simulating 100 ppm Ag in the diet inhibited rumen digestion rates. Silver compounds in areas of weather modification are very unlikely to inhibit microorganisms of the digestive tracts of livestock or wildlife. (Author abstract modified)

45207 **APTIC NO. 65031**

Bustamante, J. Bustamante, M. C. Martin Mateo, and O. Ortiz Machado

STUDY OF THE METABOLISM OF ZINC, LDH AND BLOOD PH IN LEUKEMIAS AND LYMPHOMAS. *(Estudio del metabolismo del zinc, LDH y pH sanguineo en leucemias y linfomas). Sangre, 18(3):271-276, 1973. 16 refs. Translated from Spanish, 11p.*

The metabolism of zinc, blood pH, and lactic dehydrogenase (LDH) were studied on 17 patients with leukemia or lymphomas. The zinc rate was clearly high only with Hodgkins disease. The LDH figure was increased in all cases, especially in acute leukemias. The chronic leukemias and Hodgkin s disease cases showed acidosis, while acute leukemias and non-Hodgkinian lymphomas showed alkalosis. The regression plane and the method of minimum quadrates were used to show that 73% of the three values were significant; that is, that each of the three values separately conditions the other two in 73% of the cases.

45208 **APTIC NO. 68133**

Deloff, Leonard

AGGRESSION AND DEFENSE IN THE RESPIRATORY TRACT. *(Agresja i obrona w ukladzie oddechowym). Text in Polish. Pol. Arch. Med. Wewn., 50(9):869-876, 1973.*

The effects of air pollution and cigarette smoking on the defense mechanisms in the respiratory tract are discussed. The lungs are exposed to air pollutants such as gases and dusts, cigarette smoke, industrial factors, infections, and allergens. The respiratory tract is capable of autopurification. Particulates bigger than 10 micrograms are eliminated by the phegm. Aerosols from 2 to 10 micrograms are characterized by stability. They penetrate the lower regions of the respiratory system, where they sediment. Bigger particles settle in the nose ducts. Particulates from 0.5 to 3 micrograms can penetrate and settle in the tubercles. The velocity of the mechanical cleaning of the respiratory tract is described. The particulates are transported by phlegmlike liquid. The purification lasts longer with smaller particles (4.1 micrograms), and it is shorter for larger ones (15 micrograms). Besides mechanical purification, the lungs also have phagocytotic mechanisms that destroy bacteria. Experiments conducted indicate that patients exposed to aair pollution (carbon fumes and sulfur dioxide) and smokers might have both these defense systems, i.e., of mechanical transport and phagocytosis, affected. Air pollution typical of industrial towns and settlements affects the respiratory tract and the whole organism depending upon the lung s defense potential. Most affected are usually people with deficient defense mechanisms due to genetical factors, smoking, old age changes, or chronic diseases of the respiratory tract. British studies have shown that sudden increase in the concentration of fumes, sulfur dioxide, or other compounds in the atmospheric air can cause acute respiratory insufficiency and death in patients with chronic bronchitis, emphysema, or circulatory insufficiency.

45209 **APTIC NO. 65029**

Demina, S. Y., A. P. Yermilov, T. P. Kryazhimskaya, Y. A. Magulis, N. T. Molokova, A. D. Sergeyeva, and V. T. Khrushch

CREATININE AS A REFERENCE POINT WHICH REDUCES THE STATISTICAL ERROR IN DETERMINATION OF THE PO210 CONTENT IN THE ORGANISM. *(Kreatinin kak reper, snizhayushchiy statistiheskuyu oshibku opredeleniya soderzhaniya Po210 v organizme). Gigiena i Sanit., 38(9):53-55, Sept. 1973. 1 ref. Translated from Russian. 6p.*

The principal parameter which is measured is the mass determination of the exposure of humans working with polonium (210) is the content of the isotope in a urine sample collected during a time interval. The rate of excretion equals the quantity of the isotope divided by the time interval. By tradition, the rate of excretion is characterized by the change in 24 hr, so the formula for rate of excretion equals (the quantity of isotope divided by the volume of the urine sample to be analyzed) times the daily diuresis of a standard mean. The accuracy of the determination of the rate of excretion can be increased by using the formula, rate of excretion equals quantity of (isotope divided by the creatinine content) times the average daily creatinine excretion. Fifteen samples were taken to check this equation. The determination of creatinine content in batch showed promise for reducing the statistical error involved in the determination of Po(210) content in the organism on the basis of data from an analysis of a single urine sample. When using this method for more extensive monitoring at certain locations, it will be necessary to accumulate statistical material dealing with the characteristics of creatinine excretion under specific living and working conditions.

45210 **APTIC NO. 65027**

Dugois, P. and L. Colomb

CHLORINE ACNE WITH EXPOSURE TO 2-4-5 TRICHLOROPHENOL. *(Acne chlorique au 2-4-5 trichlorophenol). 1973 (?). (Source not indicated.) Translated from French, 3p.*

A number of cases of chlorine acne (chloracne) occurred at one of the shops of a plant in the Grenoble area manufacturing 2-4-5 trichlorophenol. The symptoms of this skin disease are described. The cause of the acne was in the cleaning of vats which produced tar and chloronaphthalines when chlorobenzenes were heated. Thus, chlorinated cyclic hydrocarbons, as well as chlorinated substances legally recognized as causes of the chloracne can cause chloracne.

45211 **APTIC NO. 65023**

Golenitskiy, A. I.

CONTENT OF COBALT AND ZINC IN THE BLOOD AND THEIR DAILY EXCRETION IN TUBERCULAR PATIENTS IN THE PROCESS OF COMPLEX TREATMENT. *(Soderzhaniye kobal ta i tsinka v krovi i sutochnaya ikh ekskretsiya u vol nykh tuberkulezom v protesesse kompleksnogo lecheniya). Vrachebnoe Delo (Kiev), vol. 5:56-57, 1973. 3 refs. Translated from Russian, 5p.*

Microelements participate in the redox processes taking place in the body. The cobalt contained in vitamin B12 helps increase body resistance to harmful factors in the medium and participates in the hemopoiesis processes. Cobalt increases the utilization of amino acids and increases methionine synthesis. Zinc seems to have an influence on carbohydrate and fat metabolism, as well as on tissue respiration processes. The content of cobalt and zinc in the blood and their 24-hour excretion were determined spectrographically in 64 patients with tuberculosis. Twenty-four patients were examined in the course of antibacterial treatment, 40 during the postoperative period. The blood cobalt level was reduced in patients with tuberculosis, but no essential changes were found in the zinc level. The 24-hour excretion of cobalt and zinc with feces showed no essential changes. The content of cobalt and zinc in the blood increased during the first 24 hr after lung resection, but their urinary excretion was reduced markedly during treatment with antitubercular drugs and following lung resection.

45212 **APTIC NO. 68111**

Iwamoto, T. and N. Oomori

STUDIES ON THE SUMMER-TYPE TOKYO PHOTOCHEMICAL SMOGS. *(Natsu-gata Tokyo sumoggu ni tsuite). Text in Japan se. Minzoku Eisei (Human Hyg.), 39(6):202-203, Nov. 1973. (Presented at the Japan Society of Human Hygiene, Annual Meeting, 38th, Nov. 10-11, 1973.)*

Acute symptoms of patients suffering from summertime Tokyo photochemical smogs, represented by the episode on July 18, 1970, include not only eye irritation and respiratory symptoms typical of the Los Angeles type, but also total body discomfort, peripheral vascular dilation, and nervous disturbances. A certain pattern of weather conditions appeared during Tokyo photochemical smogs when moderate and severe human damages occurred. The pattern consists of: rain the previous day and a relative humidity the previous night of 90%; clear weather in the morning; a wind direction reversal from north to south at 9-10 am; 2-3 hr of SSW wind at 2 m/sec.; a temperature of 32-33 C; and a condensation pH of 55%. Severe leaf-necroses of Zelkova trees and brown spots with grayish-brown cloudiness on the leaves of morning glory were noted.

45213 **APTIC NO. 65615**

Jordeczka, Stanislaw, Stanislaw Basa, and Barbara Basa

THE FREQUENCY OF CHRONIC UNSPECIFIC ALTERATIONS IN THE BRONCHI AND LUNGS IN WORKERS AND OFFICE EMPLOYEES IN THE WOOL INDUSTRY. *(Czestosc przewleklych nieswoistych zmian w oskrzelach i plucach u pracownikow przemyslu welnianego zatrudnionych w produkcji i administracji). Text in Polish. Polski Tygodnik Lekar (Warsaw), 28(26):999-1002, June 25, 1973.*

The frequency of chronic nonspecific alterations in the bronchi and the lungs (c.u.a.b.l) in 171 production and office workers of the Polish wool industry was studied. The employees investigated were urban males and females of various ages and with different employment seniorities. All employees filled out questionnaires, underwent spirometric tests, and had chest X-rays. Evidence of c.u.a.b.l appeared more frequently in smokers and individuals over 40 years of age. Disease symptoms were found in 30 office employees, i.e., 17.5%, while in production workers a morbidity of 18.1% was found. Twice as frequent c.u.a.b.l were found in men and women who had been smoking for 10 or more years. Bronchitis appeared much more frequently in men than in women. Coughing, shortness of breath, and choking were observed only in women.

45214 **APTIC NO. 64988**

Kamemoto, Nobuyuki, Fujisuke Ueda, Torao Yoshinaga, Toshio Fujii, Yoshihiko Matsuda, and Hajime Kofuji

AN INVESTIGATION OF DAMAGES BY STIMULANT GASES IN IWAKUNI--BY QUESTIONNAIRE. *(Iwakuni-shi ni okeru shigekisei gasu ni yoru higai no anketo chosa ni tsuite). Text in Japanese. In: Data on Studies of Air Pollution in Iwakuni (and Waki Village). Yamaguchi Prefectural Research Inst. for Health (Japan), p. 153- 156, Dec. 1973.*

A questionnaire investigation was conducted in four junior high schools and two senior high school in Iwakuni where some health damages were reported in May 1971. The shoreline is occupied by an American military base and the northern coast is occupied by petroleum refining and petrochemical industries, the middle by pulp and chemical textile industries, and the south by a thermal electric power plant and chemical textile industries. Further north the area merges into the Otake petroleum combine. The weather was cloudy with 2 m/sec wind from the sea and a maximum temoerature of 27-28 C. The response rate from 626 pupils was 100% and 510 (81.5%) complained of some health symptoms. The ratio of complaints against bad odor and health damages were similar from three schools near the coastline. In all schools, cough, throat pain, and suffocating feelings were complained of by 60-80% of pupils. The measurements of sulfur dioxide taken at four locations in the city showed a peak at about 3 pm, coinciding with the time of incident which was between 2 and 4 pm. At one monitoring station, the SO2 concentration rose to 0.23 ppm.

45215 **APTIC NO. 65724**

Kominami, Y., R. Nakamura, Y. Maeda, K. Nakakugi, H. Yamagiwa, T. Takemura, Y. Koorida, and K. Kawai

EPIDEMIOLOGICAL AND EXPERIMENTAL STUDIES OF THE INFLUENCE OF AIR POLLUTION ON DEVELOPMENT OF THE FETUS. *(Taiki osen ga taiji hatsuiku ni oyobosu eikyo ni kansuru ekigakuteki narabini jikkenteki kenkyu). Text in Japanese. Mie Igaku (J. Med., Mie Prefect. Univ.), 17(3):268-278, Dec. 1973.*

Medical examinations, miscarriages, and stillbirth statistics are given for Yokkaichi, Sakai, and Kitakyushu. The influence of air pollution on the fetus and placenta is investigated histologically. The experimental results of exposure of pregnant mice to sulfur dioxide are given. The extended residence of pregnant women in an air polluted regions correlated with a trend towards hypertension, increased severity of edema, and positivity of proteinurea. The percentage of stillbirths was higher in the districts where a higher level of sulfur oxide existed. Morbidity of birth defects was higher in the polluted part of Sakai. The weight of placenta was higher due to the increase of mosture content, edema, fibrosis, and atrophy. No disturbances occurred in the acutely exposed rodent placenta which correlated with human data. Pregnant women in air polluted areas suffered from chronic disturbances in the vascular and renal systems which result in an increased percentage of stillbirth and placental edema which can cause birth defects.

45216 **APTIC NO. 65699**

Kosmider, Stanislaw and Adam Misiewicz

LIVER CHANGES UNDER THE INFLUENCE OF CHRONIC EXPERIMENTAL INTOXICATION WITH NITROGEN OXIDES. *(Zmiany w watrobie pod wplywem przewleklego doswiadczalnego zatrucia tlenkami azotu). Text in Polish. Patol. Polski (Warsaw), 24(3):381-390, 1973. 27 refs.*

Male guinea pigs were divided into three groups: a control group; a group of animals breathing air containing 1 ppm nitrogen oxides during 6 months, 8 hr/day; and third group exposed to products of reactions between nitrogen oxide and gaseous ammonia. The animals lived through the 6 mo with no increase in mortality. The body weight of the animals exposed to nitrogen oxides increased during the 6 mo by 62 g on the average, while in the control group the body weight increased by 395 g on the average. In homogenates of the livers of the animals exposed to nitrogen oxides, the activities of aldolase, lactic dehydrogenase, acid, and alkaline phosphatase increased, and the activities of cholinesterase, ceruloplasmin, and aminotransferases (aspartic and alanine) decreased. Neutralization of NOx by gaseous ammonia restored the disorders in enzyme activities in the liver of the animals exposed to nitrogen oxides to their normal values. The study was statistically analyzed. The livers of the animals exposed to nitrogen oxides contained small foci of necrosis, and hemorrhages could be observed. In some animals, fatty degeneration of the liver could be observed. The changes in the liver can also be associated with inhibited protein synthesis, enhanced catabolic processes, and hypovitaminosis.

45217 **APTIC NO. 65481**

McFarland, Ross A., William H. Forbes, Howard W. Stoudt, John D. Dougherty, Thomas J. Crowley, Roland C. Moore, and Theodore J. Nalwalk

A STUDY OF THE EFFECTS OF LOW LEVELS OF CARBON MONOXIDE UPON HUMANS PERFORMING DRIVING TASKS (FINAL REPORT). *Harvard School of Public Health, Boston, Mass., Guggenheim Center for Aerospace Health and Safety, Coordinating Research Council-Air Pollution Research Advisory Committee Contract CAPM-9-69(2-70), 98p., May 13, 1973. 18 refs.*

The effects of low levels of carbon monoxide on human performance in driving related laboratory tasks and in over-thr-road vehicle driving were determined in 27 subjects under conditions of 17% carboxyhemoglobin (COHb), 11% COHb, and no administered CO, or control. There is a CO-related decrement in peripheral vision which is significant at 17% COHb. No differences were found between measures of depth perception with a standard of Verhoeff apparatus at COHb levels of 11%, 17%, and control. No statistically significant differences were found at either 30 or 50 mph when occluded distances travelled on standardized runs were compared for CO (17% COHb) and no CO conditions. With CO, the subjects required significantly more roadway viewing at the higher speed than they did without CO. There was no significant effect on steering wheel reversals at 17% COHb. (Author summary modified)

45218 **APTIC NO. 65642**

Motomiya, K., K. Ito, R. Yoshida, G. Ide, Y. Otsu, and T. Nakajima

THE EFFECTS OF EXPOSURE TO OPEN AIR ON THE INFECTION OF INFLUENZA VIRUS OF MICE. *(Gaiki bakuro ga mausu no Influenza Virus kansen ni oyobosu eikyo). Text in Japanese. Chiba Daigaku Kankyo Kagaku Hokoku (Rep. Environ. Res. Organ. Chiba Univ.), 1(1):15-19, July 1973.*

Female ICR-JCL mice born and bred in a clean-air room for 3 wk were divided into two groups; the first group was kept in the clean room and the second group was exposed to open air in the center part of Osaka City for 3, 6, and 12 mo, the ambient level of sulfur dioxides being 0.04-0.07 ppm and floating dust 70-180 micrograms/sq m (1 hour average). After examining the pathological changes of airways, all the animals were subjected to influenza virus and the effects were analyzed. In the group exposed for 3 mo to open air, all the animals showed diffuse pneumonia symptoms with multilayer proliferation of peripheral bronchial epithelial cells. The group exposed to the open air for 6 mo showed a slightly higher incidence of bronchial epithelial cells without any accompanying anomalies. The group exposed for 12 mo to the open air showed slight penumonic symptons and a slight proliferation of bronchial epithelial cells. After contact with the influenza virus the penumonic symptoms were more serious in the group exposed to the open air than in the group kept in the clean room; however, no difference of pathological changes was noted between the animals exposed for different lengths of time to the open air. The dust cells appearing in alveoli were significantly more numerous as the period of exposure to the open air was longer: 1.0 + or - 0.9 (kept in clean-air room), 3.9 + or - 0.9 (exposed for 3 mo), 7.0 + or - 0.9 (exposed for 6 mo) and 8.6 + or - 2.5 (exposed for 12 mo).

45219 **APTIC NO. 68104**

Noushi, Hiroshi, Mamoru Nagasaki, and Isao Mizoguchi

THE RELATIONSHIP BETWEEN SUBJECTIVE SYMPTOM CLASSIFICATIONS IN PHOTOCHEMICAL SMOG INCIDENTS AND AIR POLLUTION. *(Kokagaku sumoggu hasseiji ni okeru jikakausho bunrui to taiki osen to no kankei). Text in Japanese. Nippon Eiseigaku Zasshi (Japan. J. Hyg.), 28(1):145, April 1973.*

Investigation was conducted twice on 74 and 50 junior high school students having subjective symptoms of injury from smog on June 25 and July 8 of 1972. Among the first group there were 27 cases of headache, 18 cases of weakness, 13 cases of malaise, 11 cases of eye irritation, 9 cases of throat pain, and others. The second group showed a comparable number of cases for each individual symptom. Classification of the symptoms and pollution index showed relationships between oxidants and breathing difficulties, numbness of hands and legs, and throat pain, and also relationships between sulfur dioxide and eye irritation, throat pain, weakness, malaise, coughing, and dizziness.

45220 **APTIC NO. 65603**

Oda, Hajime, Shigeko Kusumoto, and Taichi Nakajima

AN EXPERIMENT OF EXPOSING ANIMALS TO NITROGEN MONOXIDE, I: EXAMINATION OF EXPOSURE METHODS AND DETECTION OF NITROGEN MONOXIDE HEMOGLOBIN. *(Issanka chisso dobutsu bakuro jikken -1- bakuro hoho no kento oyobi issanka chisso hemogrobin no kenshutsu). Text in Japanese. Preprint, Japan Society of Public Health, p. 54, 1973. (Presented at the Japan Society of Public Health Kinki Branch Annual Meeting 12th, Kyoto, Japan, May 13, 1973, Paper 302.)*

Animal exposure experiments using nitrogen monoxide were carried out to exanine the effect of nitrogen monoxide on humans by investigating methods of exposure and detecting nitrogen monoxide- hemoglobin (NO-Hb) i the blood. The nitrogen dioxide usually formed by air dilution of NO was removed by a column of granular soda lime, and more than 90% nitrogen dioxide was removed. The volume of the chamber used was 1 cu m, the air flow rate was 200 l/min (12 times ventilation per hour), and the temperature was 23 C. The NO-Hb was measured by testing the blood taken from the eye-socket of 2 month-old male mice subjected to 1-hour exposure of 6-7 ppm NO. The signal obtained by electron spin resonance at 100 KC and 5 qauss was different in structure from the NO-Hb signal obtained in vitro.

45221 ***APTIC NO. 65753**

Oyagi, S., S. Komatsu, and T. Okubo

ON THE ACCUMULATIVE OCCURRENCE OF LUNG CANCER IN THE INHABITANTS AROUND THE YANAGICHO STREET CROSSING IN USHIGOME, SHINJUKU-KU, TOKYO. *(Ushigome Yanagicho kosaten fukin jumin ni okeru gan shibo no shuseki hassei ni tsuite). Text in Japanese. Tokyo- to Eisei Kyoku Gakkaishi (Rept. Tokyo Public Health Studies), no. 52:50-51, 1973. (Presented at the LII Annual Meeting of Society of the Bureau of Public Health, Tokyo Metropolitan Office, Nov. 1973.)*

Of 36 major street crossings investigated in Tokyo in 1966 the air around Yanagicho street had the highest value of carbon monoxide, 87.5 ppm, accompanied by high values for lead. Investigation of subjective symptoms of women in the area in Feb. 1968 and Jan. 1970 revealed 80% had asthmatic experiences, 84% complained of odor, and 68% of eye irritation, and 90% ascribed these symptoms to motor exhaust. Mortality from all causes was examined from 1960 within a circle of 200 m radius centered at Yanagicho crossing and outside this area. In the time period investigated there were peaks of mortality from pulmonary emphysema, chronic bronchitis, and bronchial asthma that were 7-8 times higher than levels reached in the earlier half of the period. This was also true for lung and pancreatic cancer, and the total cancer peak was three times higher than in the earlier period. The CO concentration has been rapidly decreasing since 1966 to 26 ppm in 1969, 20 ppm in 1970, 17.5 ppm in 1971, and 12 ppm in 1972. After the peak in 1969 the occurrence of cancer has also been decreasing in the abovementioned circle. In 1970 the mortality ratio of lung cancer was 12.8 (18.3 in males and 7.0 in females) in Tokyo compared to 10.2 (14.8 in males and 5.7 in females) in all of Japan. Although there is no data on trends in cigarette consumption, it is probable that the increase in deaths from cancer is due to increased motor traffic.

45222 APTIC NO. 65716

Suzuki, T., T. Endo, S. Nakazawa, S. Nagaoka, E. Yokoyama, and H. Kita

OZONE EXPOSURE AND SEROTONIN SUSCEPTIBILITY. *(Ozone bakuro to serotonin). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 8(3):427, Oct. 1973. (Presented at the Japan. Society for Air Pollution, Annual Meeting, 14th, Fukushima, Japan, Nov. 6-8, 1973.)*

The effects of serotonin on ozone exposure as a chemical mediator in allergic reactions was investigated. Male 6-7 wk old rats were exposed to 1, 3, 4, 5, and 6 ppm ozone for 3 hr, resulting in death of 0, 17, 25, 58, and 75%, respectively. Another group of rats were exposed to ozone at 5 + or - 0.2 ppm for 3 hr with intraperitoneal injections of serotonin at levels of 30, 40, and 50 mg/Kg. Mortality of ozone exposed rats was 19, 25, 58, and 83%. More rats were exposed to ozone for 3 hr at 5 + or - 0.2 ppm an/ intraperitoneally injected with 30 mg/Kg of serotonin before 15 min, 3.5 hr, 12.5 hr, and 24 hr of ozone exposure. Mortalities of 58, 50, 33, and 11% were noted. Variations in frequency and dosage of serotonin on control rats had no effects. Rats which have been intraperitoneally injected with 30 mg/Kg of serotonin and after 15 min exposed to ozone at 5 ppm for 3 hr showed a weight ratio of the lung to the whole body of 0.54 + - 0.06 and the water content of the lung of 82.3 + or - 2.0%. On the contrary, rats which have been exposed to ozone at 5 ppm for 3 hr and then intraperitoneally injected with the same amount of serotonin showed a weight ratio of the lung to whole body of 0.083 + or - 0.10 and the water content of the lung of 85.6 + or - 1.2%. The time for metabolizing serotonin in the blood was 3.5 hr and in whole body 12-14 hr.

45223 APTIC NO. 65666

Tomita, K., S. Nakano, L. Horiuchi, S. Horiguchi, T. Utsunomiya, K. Shinagawa , K. Teramoto, and T. Fujii

RESULTS OF INVESTIGATION CONCERNING LABOR HYGIENE OF THE WORKERS IN THE CHARGE COLLECTING OFFICES OF SPEEDWAYS. *(Kosoku doro no ryokin choshujo jugyo-in no rodo eisei-gaku teki jittai chosa). Text in Japanese. Kyoto-shi Eisei Kenkyusho Eiken Nenpo (Ann. Rept. Kyoto City Inst. Public Health), no. 39:126-127, 1973.*

An industrial hygienic investigation was carried out far 3 days in March 1971 on tall-collectors. The effect of their environmental conditions, such as concentration of lead, (carbon monoxide) floating dust, and oxides of nitrogen on subjective symptoms, hematology, urine, sputum, amount of carbon monoxide in expired air lung function, and blood chemistry. The atmospheric content of lead during the 3 days was less than 4 micrograms/cu m except for two peaks of 7 and 12 micrograms/cu m. The level of CO 1-5.5 ppm, nitrogen dioxide was 0.5-.30 ppm, and sulfur dioxide was 1-.06 ppm. The large amount of floating dusts was due to truck exhaust. The average concentrations of CO in expired air and carboxyhemoglobin of 22 smokers and seven non- smokers were respectively 24.6 + or - 5.5 ppm, 12.9 + or - 2.3 ppm, and 5.7 + or - 0.9 and 2.8 + or - 0.5 volume percent. The vital capacity, VCsec, and Vsec were, respectively, on the average, 3785 + or - 493, 3272 + or - 452 and 87 + or - 5 in 17 smokers.

45224 APTIC NO. 65605

Uchiyama, T.

DETECTION OF RESPIRATORY DISEASES BY BIOCHEMICAL FIELD. *(Hatsugen; seikagaku-men karano kensaku). Text in Japanese. Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic, Dis.), 11(12):743-745, Dec. 1973. (Presented at the II Symposium Air Pollution and Respiratory Diseases at the 13th Annual Meeting of the Japan Society of Thoracic Diseases, April, 1973.)*

Rabbits and rats were exposed for 2-4 hr to ozone-containing air (10-20 ppm) and their lungs were removed. The change in cellular membrance was determined by the activity of ATP. The lipids which are the constituent of the membrane and the major component of the surfactant of the membrane were analyzed by chromatography. The activity of ATPase in the lung tissue was depressed by inhalation of ozone with the simultaneous depression of Na-K ATPase, suggesting disturbance of the function of the cellular membrane by ozone. Fractions such as phospholipids, Cholin, free fatty acids, triglycerides, and cholinesterase were not affected by ozone; however, when phospholipids were further fractioned, a decrease of lecithin was found in lung tissue and in the washings of bronchus. Intake of 14C-palmitic acid showed the intake of fatty acid into phospholipids was inhibited by ozone. Peroxidation of lipids by ozone appeared with increased value of TBA, especially in phospholipids and triglycerides, showing the peroxidation of unsaturated fatty acid moiety. When vitamin B2 butyrate and vitamin E were administered before ozone inhalation the increase of TBA value was depressed, as was the case when 10 mg/Kg of the vitamins were administered after ozone- inhalation.

45225 APTIC NO. 65053

Voisin, C., A. B. Tonnel, B. Douay, M. Jacob, and J. Lefebvre

AN INVESTIGATION OF NEUTROPHILIC POLYNUCLEAR BACTERICIDAL PROPERTIES IN ASTHMATIC AND BRONCHITIC PATIENTS TREATED WITH CORTICOIDS. *(Etude du pouvoir bactericide des polynucleaires neutrophiles chez les asthmatiques et les bronchitiques traites par corticoides). Rev. Franc. Allergol., 13(2):97-106, 1973. 29 refs. Translated from French, 14p.*

A decrease of more than 20% in the bactericidal activity of circulating polynuclear cells was found in 11 asthmatics and chronic bronchitics treated with corticoids. No disturbance was noted in 18 patients suffering from chronic bronchial infection and six with pulmonary cancer who had not undergone corticotherapy. There was a correlation between the drug dosage and the decrease in bactericidal activity. In one patient, repeated tests showed a progressive and complete return to normal after a considerable reduction of corticoid intake. These facts should be compared with experimental results in vivo and in vitro concerning the action of corticoids on phagocytic cells and disturbances in the nitroblue tetrazolium test recently noted in patients treated with corticoids. However, at present it is not possible to state positively that a decrease in polynuclear bactericidal activity plays an active part in the onset of chronic or recurrent bronchial infections.

45226 APTIC NO. 65054

Voisin, C., C. Aerts, J. L. Houdret, and A. B. Tonnel

EFFECTS OF NO2 ON ALVEOLAR MACROPHAGES. *(Action du NO2 sur les macrophages alveolaires). Inst. Pasteur de Lille, Lille (France), Inst. National de la Sante et de la Recherche Medicale Special Study 8, 1973 (?). 16 refs. Translated from French, 18p.*

Exposure of guinea pig cells to an atmosphere containing 50 ppm of nitrogen dioxide for 3 hr resulted in considerable disturbances of the macrophage cell population collected by bronchopulmonary lavage: cell destruction, which was evaluated morphologically and by Trypan Blue staining; and a decrease in in vitro bactericidal activity for cells surviving the effects of the toxic gas. In vitro exposure, produced by bubbling NO2 through alveolar macrophages kept alive in suspension, also decreased cell vitality as determined by migration tests and by study of bactericidal activity. It should be taken into account that nitrate and nitrous ions whose cytotoxic effects have not yet been clearly determined appear in the liquid through which the gas is bubbled in the vitro experiments.

45227 APTIC NO. 65390

Jefferson Medical Coll., Philadelphia, Pa., Dept. of Physiology

THE EFFECT OF CARBON MONOXIDE INHALATION ON INDUCED VENTRICULAR FIBRILLATION IN

THE CYNOMOLOGUS MONKEY. *Coordinating Research CouncilaAir Pollution Research Advisory Committee Contract Proj. CAPM-4-68, 35p., July 1973. 16 refs.*

The effect of carbon monoxide inhalation on induced ventricular fibrillation in the cynomologus monkey was investigated. Normal monkeys and monkeys with acutely induced myocardial infarction (MI) were immediately exposed to 100 ppm CO for 6 hr. Blood carboxyhemoglobin at the end of the 6 hr exposure was 9.2%. In noninfarcted, air-breathing animals, ventricular fibrillation was induced at 78.5 volts, in air-breathing infarcted animals at 50.6 volts, in noninfarcted animals exposed to CO at 45 volts, and in infarcted animals exposed to CO at 30 volts. Myocardial infarction and CO inhalation were significant factors in enhancing the vulnerability of the ventricle to induced fibrillation. The effects appeared to be additive for MI and CO since no significant interaction of the two could be demonstrated. (Author summary modified)

45228 **APTIC NO. 65406**

National Academy of Sciences, National Research Council,
Washington, D.C., Committee on Biologic Effects of
Atmospheric Pollutants

MANGANESE. *Environmental Protection Agency Contract 68-02-0542, 191p., 1973. 555 refs.*

Information on manganese in the ecosystem, Mn and plants, biochemistry and the metabolic role of Mn, the interrelations of Mn and catecholamines, the epidemiology of Mn intoxication and permissible air concentrations, neurobehavioral effects of Mn deficiency and toxicity, and methyl manganese tricarbonyl compounds is presented. High concentrations of Mn in the atmosphere are usually the result of man s activities. Current Mn pollution of the atmosphere is a local problem, for the most part an in-plant, rather than an ambient-air problem. Widespread use of Mn fuel additives might create a more general ambient-air problem. This possibility requires objective evaluation before the additives come into general use. Manganese pollution of water appears not to be a problem, except under very unusual local circumstances. Manganese intoxication in man is primarily the result of inhalation, although absorption via the gastrointestinal tract and even through the skin has been reported. The most notable effects of excessive exposure result from actions on the central nervous system. (Author conclusions)

1972

45229 **APTIC NO. 65028**

Dobrokhotov, V. B.

THE MUTAGENIC INFLUENCE OF BENZENE AND TOLUENE UNDER EXPERIMENTAL CONDITIONS. *(O mutagennom vliyanii benzola i toluola v usloviyakh eksperimenta). Gigiena i Sanit., 37(10):36-39, Oct. 1972. 8 refs. Translated from Russian, 7p.*

Twenty male white rats were divided into four groups: the first group received a 10% oil solution of benzene daily for 12 days, administered subcutaneously, at a dose of 0.2 g/kg; the second group received an oil solution of toluene at a dose of 0.8 g/kg; the third group received an oil solution of a mixture of benzene and toluene, at doses of 0.2 and 0.8 g/kg, respectively; the fourth group, which served as the control, received a sterile vegetable oil subcutaneously at the rate of 2 g/kg. The cell composition of the peripheral blood was examined prior to poisoning and after poisoning, and the genetic effects of the pollutants were determined on the basis of marrow preparations. Chromosomal changes were detected by the metaphasic method. Subacute poisoning by a mixture of benzene and toluene caused problems with the cellular composition of the peripheral blood (lymphopenia, increase in the total number of neutrophils and stabform neutrophils). The lymphopoietic reaction to the mixture of benzene and toluene was similar to the reaction to benzene alone, while the neutropoietic reaction was similar to the reaction to toluene alone. In cases of subacute poisoning with a mixture of benzene and toluene, there was a summation of their individual mutagenic action on the marrow cells of white rats.

45230 **APTIC NO. 65471**

Hausknecht, D. F.

PUBLIC HEALTH RISKS OF THERMAL POWER PLANTS. APPENDIX VI. APPROXIMATE MORTALITY RISK FROM SO2 AND PARTICULATES. *California Univ., Los Angeles, School of Engineering and Applied Science, UCLA-ENG-7242, 8p., May 1972. 4 refs.*

A correlation of increases in mortality rates of populations living in polluted areas was developed based on epidemiological data. The degree of physiological effect was proportional to the product of sulfur dioxide level and the root of exposure time. This proportionality held over the range from a few ppm for a few minutes to a few hundredths of a ppm for a year. Eight excess deaths attributed to air pollution episodes were correlated with the product of maximum 24-hour average concentrations of SO2 and particulate matter. There were plotted on a common set of logarithmic axes along with an annual average mortality rate attributed to pollution. The data were plotted in terms of excess mortalities per 10 million people versus the product of the average levels of SO2 (ppm) and particulate matter (micrograms/cu m) times duration of exposure (years).

45231 **APTIC NO. 65045**

Linoli, G., G. Tarenghi, and C. Bergonzi

A NEW SUBSTRATE FOR THE DETERMINATION OF LEUCINE AMINOPEPTIDASE IN SERUM. *(Un nuovo substrato per la determinazione della leucin- aminopeptidasi nel siero). Quad. Sclavo Diagn. Clin. Lab., 8(1):504-515, 1972. 10 refs. Translated from Italian, 15p.*

A new substrate for determining leucine aminopeptidase activity in serum was synthesized. A simple, rapid, sensitive method, suitable for routine clinical analysis was developed. The m-anisidine liberated from the new, highly-soluble substrate l-leucyl-m-anistidide was determined by direct coupling reaction with a Fast Color Salt. The specificity, accuracy, and precision of the method were ascertained. A highly significant correlation was found between the results obtained with the present method and the ones obtained with traditional methods using l-leucyl-beta-naphthylamide and l-leucyl-p-nitroanilide as substrates. The determination of leucine aminopeptidase in serum is diagnostically valuable in determination of hepatopathy, and is superior to that of alkaline phosphates.

45232 **APTIC NO. 65723**

Nakajima, T., S. Kusumoto, Y. Tsubota, E. Yonekawa, R.
Yoshida, K. Motomiya, K. Ito, G. Ide, and H. Otsu

ON THE HISTOPATHOLOGICAL CHANGES OF THE RESPIRATORY SYSTEMS OF MICE EXPOSED TO PHOTOCHEMICAL OXIDANTS AND AUTOEXHAUST. *(Kokagaku okishidanto oyobi jidosha haiki gasu ni bakuro shita mausu kokyoki no byori-soshikigakuteki henka). Text in Japanese. Osaka Furitsu Koshu Eisei Kenkyujo Kenkyu Hokoku, Rodo Eisei-hen (Proc. Osaka Public Health Inst., Ed. Ind. Health), vol. 10:35-42, Sept. 1972. 12 refs.*

Mice were exposed 3-4 wk after birth to two levels of artificial oxidants at 0.1-0.15 and 0.1-0.5 ppm, and to the exhaust of a car engine 2-3 hr/day, 5 days/wk for a month and sacrificed. The general status and the body weight of exposed animals showed no difference to those of animals kept in a clean air room for the same period. Mice exposed to 0.1-0.015 ppm of oxidant showed an irregular arrangement of epithelial cells of the relatively large bronchi; slight edema on alveolar walls and tissues around bronchi, a slight hyperemia of veins in the alveolar walls with partial bleeding and infiltration of smaller round cells; and the disappearance of cilia on trachea and degeneration of tracheal epithelial cells. Mice exposed to 0.1-0.5 ppm of oxidants showed cellular and tissue anomalies of the bronchi and alveoli resembling bronchial pneumonia; proliferation of larger tracheal epithelial cells with eosinophilic cytoplasma and elliptic nuclei; moderate edema in bronchial tissues and moderate hyperemia of alveolar veins; lymphatic follicles increasing around the bronchus; and a partial disappearance of cilia and degeneration of the trachea and its epithelial cells. Mice exposed to engine exhaust also showed cellular and tissue changes of the bronchi and alveoli suggesting bronchial pneumonia. Symptoms found in animals exposed to 0.1-0.5 ppm of oxidant were, however, more serious.

45233 APTIC NO. 65740

Nakamura, S., Y. Nakayama, and T. Miura

INFLUENCE OF AUTOEXHAUST AND OXIDANTS ON MICE. *(Haiki gasu oyobi okishidanto no mausu ni oyobosu eikyo). Text in Japanese. Osaka Furitsu Koshu Eisei Kenkyujo Kenkyu Hokoku, Rodo Eisei-hen (Proc. Osaka Public Health Inst., Ed. Ind. Health), vol. 10:29-33, Sept. 1972. 14 refs.*

Male ICR-JCL strain mice were exposed 3 wk after birth to engine exhausts containing 40-60 ppm carbon monoxide to 0.6-0.1 ppm of artificial oxidants made by irradiation of the exhaust with ultraviolet light. Three were exposed for 2 1-hour periods/day, 4 days/wk for 9 wk. After the total exposure cycle, radioactive gold microparticles were injected via the tail vein in amounts of microCi/g B.W., and the blood was collected from the plexus orbitalis after 2 and 12 min of the injection; removal velocity of the gold was determined by finding the radioactivity in the blood. After the exposure, aqueous radioactive gold particles were sprayed on the mouse to force inhalation and the animal was sacrificed after 15 min and 18 hr to determine the radioactivity of gold in the liver to examine retention. For mice which had inhaled autoexhaust the weight of liver, spleen, and lung was smaller than the control; the white blood cells decreased without change of constitution; and the removal velocity of foreign matter was smaller than the control: mice having inhaled artificial oxidant showed white blood cells which had with a change of constitution; and the rejection mechanisms was even further impaired. The WBC decrease was transitional and an increase in the total number of alveolar macrophages was noted in bath experimental groups. It was 68 + or - 34, 31 + or - 26, and 19 + or - 8 (200000) respectively in mice inhaling autoexhaust, oxidants, and control.

45234 APTIC NO. 65010

Nguyen-Huy, H., R. Bockel, G. Pfrunner, and A. Stahl

ASSAYS FOR ORNITHINE-CARBAMOYL-TRANSFERASE AND ARGINASE IN BIOPSY SAMPLES FROM STEATOSIC AND CIRRHOTIC HUMAN LIVER. *(Dosage de l ornithine-carbamoyl-transferase et de l arginase dans les prelevements biopsiques de foie humain lors de steatoses et cirrhoses). Ann. Biol. Clin. (Paris), vol. 30:309-317, 1972. 30 refs. Translated from French, 20p.*

Ornithine-carbamoyl-transferase (OCT) and arginase are two enzymes localized essentially in the liver. In certain hepatic diseases, the metabolisms of urea and ammonia are disturbed. The link between observed metabolic modifications and enzyme deficiencies was studied. A colorimetric method was developed which measures both arginase and OCT in small needle-puncture liver biopsies. Results are given obtained from subjects presenting diverse histologically confirmed hepatic disorders and from subjects free of any hepatic disturbance.

45235 APTIC NO. 65469

Starr, C. and M. A. Greenfield

PUBLIC HEALTH RISKS OF THERMAL POWER PLANTS. *California Univ., Los Angeles, School of Engineering and Applied Science, UCLA-ENG-7242, 68p., May 1972. 14 refs.*

The public health risks of thermal nuclear power plants were determined and compared to fossil fuel plants. The risks from the routine operation of both plants are in the range of the very low hazards to which the public is exposed by uncontrollable events of nature, about one death/yr in a million population. Routine operation of a nuclear plant presents a significantly smaller public health risk than the routine operation of an oil-fired plant, typically by a factor of 10 to 100. The public health risk due to accidental releases from either plant are of the same magnitude, and about 100 thousand times smaller than the risk from routine operation of the plants. For the oil-fired plant, rare hypothetical combination in a variety of airborne pollutants, respiratory epidemics, and chronic irritants might substantially increase regional fatalities. There is also a synergistic effect of pollutants from the oil-fired plant other than sulfur dioxide, such as nitrogen oxides, heavy metals (lead, mercury, cadmium, nickel), radioactive elements, carbon monoxide, and carcinogenic compounds. Nitrogen oxides in particular may be a serious hazard, but little is known about its quantitative health effects as yet.

45236 APTIC NO. 65307

Van Duuren, B. L.

EPOXIDES, HYDROPEROXIDES AND PEROXIDES IN AIR POLLUTION. *Int. J. Environ. Anal. Chem., vol. 1:233-241, 1972. 11 refs. (Presented at the Canadian Chemical Conference, 54th, Symposium on Recent Advances in the Analytical Chemistry of Organic Pollutants, Halifax (Nova Scotia), May 31-June 2, 1971.)*

The health hazards posed by olefins emitted from automobile exhaust gas are discussed. Olefins undergo autoxidation and photochemical oxidation in air to hydroperoxides, peroxides, epoxides, and other oxygenated aliphatics, frequently of low molecular weight. Long term carcinogenicity assays of these compounds in mice and rats by various routes of administration show that some of these compounds are carcinogenic. The current status of air pollution research on these compounds, their carcinogenicity, and structure activity relationships are described. Oxidation products of aromatic hydrocarbon pollutants may be more active biologically than the parent hydrocarbon. (Author abstract modified)

45237 APTIC NO. 68109

Yokoyama, E.

STUDIES ON THE EFFECTS OF OXIDANTS ON LIVING BODIES. *(Okishidanto-to no seitai ni oyobosu eikyo ni kansuru kenkyu). Text in Japanese. In: Kogai Chosa Kenkyu Itaku Jigyo Hokokusho. 35p., March 1972. 9 refs.*

Two series of animal experiments were carried out to examine the effect of ozone inhaled during exercise. One experiment using the isolated upper airway of a dog suggested that the amount of ozone arriving at lower airway, e.g., the amount of ozone exposure, was increased by motion consisting mainly of oral inhalation under the ozone-polluted air far more than the increment of apparent exchange volume. The second experiment in which rats inhaled 0.55 ppm O3 during swimming showed an increase of moisture content in the lung, thought to be caused by the increase of ozone exposure. The amount of ozone exposure is increased by exercise in ozone-polluted air.

1971

45238 APTIC NO. 65465

Berry, R. J.

ENVIRONMENTAL MUTAGENESIS IN A GENETICAL PERSPECTIVE. *Int. J. Environ. Studies, 1(3):201-209, 1971. 60 refs.*

Questions concerning environmental agents known to cause mutations are discussed. Much of the work of radiation geneticists is concerned with establishing the meaning of the relationship between a dose of radiation and the yield of mutations produced in an exposed animal or plant. It is not possible to equate a mutation-causing event in a developing germ cell with a mutation being transmitted by that germ cell. Repair mechanisms exist which can be enhanced or inhibited by appropriate agents. A mechanism is thus provided for placing the mutation rate of a gene in a species under metabolic control, and hence adjustable by natural selection. Mutational damage is not solely dependent upon mutagen concentration. If a mutation rate for a gene seems to be too high (i.e., much more than about .00001/locus/generation), it may be suspected that other factors than mutation are holding an allele in the population. Subviable genotypes being regularly produced is the penalty for maintaining a well-adapted heterozygote. Methods exist for measuring the relative contributions of the mutant and segregational loads to a population, but they are influenced by irrelevant factors to such an extent as to vitiate their usefulness. A high proportion of amino acid substitutions producing protein variants may change the property of the protein of which they are a part and thus are subjec to selection. Since the majority of phenotypic traits are determined multigenically, the variability of a character will depend on many segregating alleles. Genes are based upon DNA polymers, and change at any base pollution constitutes a mutation. Thus a gene can mutate many different ways. Genetical heterogeneity per se is in no way detrimental. Radiation induced mutations are not unconditionally harmful.

45239 **APTIC NO. 65676**

Davies, C. Norman

DEPOSITION OF INHALED PARTICLES IN MAN. *Chem. Ind. (London), no. 11:441-444, June 1, 1971. 14 refs. (Presented at the British American Tobacco Co. Ltd., Conference on Aerosol Physics, Southampton, Sept. 20-21, 1973.)*

Past studies of deposition of particles of dusts and aerosols in the lungs during steady breathing gave an enormous amount of scatter. The major cause for the scatter was experimental error, most of the errors resulting in larger lung deposition than actually occurs. Recent work on lung deposition with uncharged spherical drops of extremely low vapor pressure using concentrations low enough to avoid coagulation gave lower results. The deposition was as low as 10-15% for particles in the size range of 0.5-1.0 micron diameter. There was practically no change in the deposition over this range of sizes. The anatomy of the airways in the human lungs is the main reason for the low deposition. Since particles diffuse very much more slowly than gases, they can travel only a little way into the reserve air during breath. Most 0.5 micron particles are breathed out again after traveling distances up to 41 cm from the mouth through tubes with diameters down to 0.5 mm. The 10-15% of particles deposited is the fraction which transfers from the tidal air to the reserve air in the 200 cu cm dead space airways due to inertial mixing. There is also practically no difference between the deposition of 0.5 micron and 1.0 micron particles during steady breathing. The rates of sedimentation are, respectively, 0.001 and 0.0035 cm/sec. While it is true that sedimentation is responsible for deposition upon the alveolar wall, it is not the rate determining factor; the factor determining the rate of deposition is mechanical mixing of tidal and reserve air in the dead space. Between 1 and 2 micron, the factor controlling the rate of deposition becomes sedimentation due to gravity. As in the case of total deposition, alveolar deposition has also been overestimated in the past. At 0.5 micron diameter, all particles of compact shape which deposit are lost in the alveolated airways; at 10 micron it is unlikely that any particles penetrate beyond the dead space. The risk of bronchial carcinoma associated with smoking is probably due to the presence of hygroscopic particles of 0.2-0.5 micron diameter, provided that the smoker inhales the smoke and holds it in the bronchi for a few seconds before exhaling so that the particles may coagulate.

45240 **APTIC NO. 65852**

Groppel, B. and A. Hennig

ZINC DEFICIENCY IN RUMINANTS. *(Zinkmangel beim Wiederkaeuer). Arch. Exp. Veterinaermed., vol. 25:817-821, 1971. 14 refs. Translated from German, 9p.*

The influence of 6-7 ppm zinc in the diet of female goats, compared to normal intake of 80 ppm Zn, was studied over a number of years with respect to weight development, milk-producing capacity, and reproductive capability. The symptoms of the deficiency are reported, and the effects on the offspring are reviewed. In zinc-deficient, lactating goats, the secretion of Zn in milk accentuated the Zn deficiency, and the goats became severely emaciated and died. A Zn-deficient diet only slightly affected the reproductive function of female goats, but the male offspring of these goats grew poorly and their maturity was delayed. The Zn content of hair and milk of female goats and of the femur and liver of their newborn offspring provided good indications of the degree of Zn deficiency. The hair of Zn-deficient goats was greasy and matted, and the behavior of the goats was marked by signs of restlessness and nervousness.

45241 **APTIC NO. 65044**

Lorentz, K. and W. Wrabetz

DETERMINATION OF ORNITHINE-CARBAMYL-TRANSFERASE BY THE FEARON REACTION. II. DETERMINATION OF ENZYME ACTIVITY. *(Bestimmung von Ornithin-Carbamyl-Transferase mittels Fearon-Reaktion. II. Mitteilung: Enzymbestimmung). Z. Klin. Chem. Klin. Biochem. (Munich), 9(3):220-223, 1971. 28 refs. Translated from German, 15p.*

Methods for the determination of ornithine-carbamyl-transferase activity, based on the measurement of citrulline, are briefly reviewed. The present technique was developed from these methods. There is no preincubation, and the disadvantages of nonenzymic citrulline formation and the production of urea from the cleavage of carbamyl phosphate are avoided. The method is simple, rapid, and precise. The serum and liver enzyme showed the following characteristics: optimum pH 7.65; Km ornithine 0.5 mM; Km carbamyl phosphate 1.25-1.85 mM; activation energy 11,830 cal/mol; it contained essential sulfhydrl groups and the normal range is 0.63-4 mU/ml serum. Determination of ornithine-carbamyl-transferase activity can be used as an indication of liver damage, and thus of hepatitis.

45242 **APTIC NO. 65462**

National Academy of Sciences, National Research Council,
Washington, D.C. Committee on Biologic Effects of
Atmospheric Pollutants

ASBESTOS: THE NEED FOR AND FEASIBILITY OF AIR POLLUTION CONTROLS. *Environmental Protection Agency Contract CPA 70-42, 40p., Dec. 1971. 170 refs.*

Currently available information on asbestos as an air pollutant, is presented with special attention to sources, health effects, measurements, and feasibility of control. Any of the commercially used asbestos minerals, when inhaled in sufficient amounts, as in uncontrolled occupational exposures, can cause disabling fibrosis of the lungs. An association between occupational exposures to asbestos and bronchogenic carcinoma has been established, but the dose-response relation and the role of cofactors have not been defined. Evidence of a causal association between somy but not all exposures to asbestos fibers and diffuse malignant mesotheliomas of the pleura and peritoneum is substantial, but evidence of such a relation with other tumors is inconclusive. Although the different types of asbestos differ in some of their biologic effects, no type can be regarded as free of hazard. The hypothesis that asbestos fibers act as cofactors or carriers of carcinogens is conceivable, but unproved. Analytic methods and epidemiologic data are not yet adequate for the development of an ambient air standard, but emission controls are needed and appear to be feasible. (Author conclusions modified)

1970

45243 APTIC NO. 65037

Moretti, G., J. Staeffan, P. Ballan, J. Ferrer, J. C. Roques, A. Broustet, and J. Beylot

A FAST AND SIMPLE TECHNIQUE FOR THE ASSAY OF SERUM ORNITHINE- CARBAMOYL TRANSFERASE. *(Une technique simple et rapide de dosage de l ornithine-carbamoyl transferase du serum. Interet et limites). Ann. Biol. Clin., vol. 28:79-83, 1970. 19 refs. Translated from French, 11p.*

A quick and simple colorimetric method of assessing the amount of the specific hepatic enzyme ornithine-carbamoyl transferase in the serum is described. This method was used with 75 normal subjects and 34 patients suffering from hepatic disorders. The enzyme was assessed by this method with microdiffusion in a Conway cell which served as a reference method because of its great sensitivity. The upper limit of normal values can be fixed at 0.9 International Unit/l of serum, and a higher level is definitely pathological. On the other hand, figures of less than 0.90 I.U./l cannot always be considered normal, since this method, while it is simple to carry out, lacks sensitivity.

1965

45244 APTIC NO. 65429

Ghelberg, N. W. and V. Stanculescu

TOXICOLOGIC STUDIES ON THE INFLUENCE OF ATMOSPHERIC LEAD ON SOME PARTIAL METABOLISMS. *(Cercetari toxicologice cu privire la influenta plumbului din aerul atmosferic asupra unor metabolisme partiale). Text in Rumanian. Igiena (Bucharest), 14(3):147-153, March 1965. 37 refs.*

Studies were conducted on 550 10-to 12-year-old children, in two series (the fall of 1962 and spring of 1963) by dividing the children into three experimental groups, with children representing three areas, situated at different distances from the source of pollution, and one group from a control city. The object of the study was to determine the influence of lead in the air on the functioning of the saliva glands. Samples were taken at 8 am before eating. From each child, 8 ml of saliva was collected and immediately subjected to analyses of the uric acid, sulfur cyanide, ammonia, amylase, and reduced glutathione contents. Study results indicated that under the continuous influence of the relatively low concentrations of lead in the atmospheric air of the industrial center studied, significant changes occurred in the saliva glands concerning the uric acid, sulfur cyanide, and ammonia excretions: the first increased, while the latter two decreased. Parallel tests conducted on white mice, which showed a significant increase of sulfur cyanide in the liver, may prove that the sulfur cyanide formed is retained by the organism. Thus, under the influence of the lead in the air, the body uses bigger quantities sulfur cyanide, which leads to a decrease in its excretion.

1959

45245 APTIC NO. 65399

Atyakina, I. K.

THE COMBINED ACTION ON THE BODY OF SMALL CONCENTRATIONS OF SULFUR DIOXIDE GAS AND OR HIGH AIR TEMPERATURE. *(O kompleksnom vliyanii na organizm malykh kontsentratsiy sernistogo gaza i vysokoy temperatury vozdukha). Text in Russian. Gigiena i Sanit., no. 10:26-31, 1959. 5 refs.*

The combined action on the organism of sulfur dioxide and elevated temperature was studied on rabbits and in workers exposed to SO2 in a chemical plant. In rabbits exposed to SO2 concentrations of 0.08-0.1 and 0.02 mg/l for 12 wk at temperatures ranging from 35 to 40 C, reduction of the phagocytic activity of the leukocytes, of the leukocyte and erythrocyte counts, and of the serum albumin level, as well as change in the vitamin C content were observed. Insignificant variations of the phagocytic activity of the leukocytes were observed in rabbits exposed to 0.005 mg/l concentration of SO2 at the same temperature for 18 wk. The maximum allowable workplace concentration as adopted for SO2 (0.02 mg/l) should be lowered, especially for high- temperature workplaces. Reduction of the phagocytic activity of the leukocytes was observed also in workers of a chemical plant who were exposed to 0.005-0.07 mg/l concentrations of SO2 and 0.0008-0.052 mg/l concentrations of sulfuric acid at temperatures of 20-45 C.

45246 APTIC NO. 65032

Braun, W.

CLINICAL OBSERVATIONS OF THE ORIGINS OF CHLORACNE. *(Klinische Beobachtungen zur Entstehung der Chloracne). Hautarzt Z., vol. 10:126-129, 1959. 11 refs. Translated from German, 9p.*

The clinical observations of 123 patients with chloracne are reported. The ailment was caused by contact with a dipping wax made of Nibren (chloronaphthalene) in a condenser factory. In some cases, indications of the exterior origins of chloracne were available. Similar outbreaks of chloracne have occurred in other industries where persons were exposed to chlorinated aromatic hydrocarbons. The symptoms of the chloracne cases are reviewed.

1958

45247 APTIC NO. 65012

Yukio, Suzuki, Nishiyama Keitaro, Matsuka Yutaka, Oe Masahiro, Kuwai Shigeru, Takano Yuji, Tajiri Tamotsu, Oshima Minoru, and Miyazaki Michito

STUDIES ON SELENIUM POISONING. PART 1. SURVEY OF MINERAL POLLUTION CAUSED BY A SELENIUM REFINING PLANT. *(Seren chudoku ni kan-suru kenkyu. Daiippo. Bo seren seiren kojo no kogai ni kan-suru chosa kenkyu). Tokushima Univ. (Japan), Dept. of Hygiene, p. 846-854, Feb. 10, 1958. 10 refs. Translated from Japanese, 26p.*

Selenium emitted by a selenium refinery had a detrimental effect on the health of the population in the neighborhood of the plant. Other toxic substances emitted by the plant were lead and sulfur dioxide. The effect of these pollutants on the health of employees and villagers, subjective and objective symptoms, concentrations of pollutants in the air at various locations and in flue gas, lead concentrations in the hair of villagers, mortality, and amounts of selenium in plants and foods were surveyed. Selenium was exhausted as gas, dust, or waste liquid. Increased selenium concentrations were found in the waste liquid and soil of the area. Over 0.1 ppm selenium was found in 24% of the urine specimens obtained from area residents. There was no detectable increase of selenium content in drinking water, plants, farm products, or the nail clippings or hair of residents. The majority of the examined population of the village exhibited both subjective and objective symptoms suggestive of selenium poisoning. These symptoms included yellowish or sallow facial skin, ridging or discoloration of nails, anemia, and hypotension. Lead and sulfur dioxide did not seem to be the cause of any harmful effects to plants or animals.

1957

45248 **APTIC NO. 65049**

Hofmann, H. T.

NEW EXPERIENCES WITH HIGHLY TOXIC CHLORINATED HYDROCARBONS. *(Neuere Erfahrungen mit hochtoxischen Chlorkohlenwasserstoffen). Arch. Exp. Pathol. Pharmakol., vol. 232:228-230, 1957. 3 refs. Translated from German, 4p.*

When a decomposition occurred during the production of 2,4,5-trichlorophenol from 1,2,4,5-tetrachlorobenzene and an alkaline methanol solution, some of the vapor escaped into the autoclave. About 10 days later, some workers came down with a skin disease, but test animals seemed normal. Later some workers had acute cases of dermatitis and some had classical cases of chlorine acne (chloracne). Test animals were placed into the autoclave for a second time. Rats showed no symptoms, guinea pigs exhibited only nonspecific reactions, cats exhibited diffused loss of hair and hyperkeratosis of the skin, and rabbits died of acute necrosis of the liver, the latter two occurrences after a period of latency. Rabbits were then exposed to autoclave residue and dirt by various means. Despite intensive cleaning of the workroom, all test rabbits died within 4 mo from acute necrosis of the liver or other severe liver malfunctions, following a 3 to 5 day exposure in the room. Isolated light cases of chlorine acne were still observed during the cleaning process. Extract of the insulating material from the autoclave caused fatal necrosis of the liver within 8 days following a single oral administration to rabbits. While trichlorophenol and tetrachlorobenzene were not responsible for the chlorine acne and liver necrosis in rabbits, numerous chlorodiphenylenoxides were highly toxic, and similar toxic compounds were formed during the decomposition of trichlorophenol.

45249 **APTIC NO. 65047**

Kimmig, J. and K. H. Schulz

OCCUPATIONAL ACNE (CHLORACNE) CAUSED BY CHLORINATED AROMATIC CYCLIC ETHER. *(Berufliche Akne (sog. Chlorakne) durch chlorierte aromatische zyklische Aether). Dermatologica, vol. 115:540-546, 1957. 9 refs. Translated from German, 8p.*

Among workers employed in the production of 2,4,5-trichlorophenol and its further processing into 2,4,5-trichlorophenol hydroxyacetic acid or its esters, 31 cases of chloracne were observed. It was experimentally shown, by painting various compounds onto a rabbit s ear, that it is not the trichlorophenol itself which causes chloracne, but rather a toxic by-product formed by the alkaline hydrolysis of 1,2,4,5-tetrachlorobenzene into 2,4,5-trichlorophenol. Of the compounds which could result from this reaction, three- and four-fold chlorinated dibenzofuran and tetrachlorodibenzodioxin were extremely active. Sodium trichlorophenolate could produce 2,3,6,7-tetrachlorodibenzodioxin, and it was isolated from the by-products.

45250 **APTIC NO. 65048**

Kimmig, J. and K. H. Schulz

CHLORINATED AROMATIC CYCLIC ETHER AS THE CAUSE OF SO-CALLED CHLORACNE. *(Chlorierte aromatische zyklische Aether als Ursache der sogenannten Chlorakne). Naturwissenschaften (Berlin), 44:337-338, 1957. 3 refs. Translated from German, 4p.*

Skin modifications were detected on factory workers at various installations in which conventional technical methods of saponification of tetrachlorobenzene into trichlorophenol and its further processing were carried out. These case histories were characteristic of the skin condition of chloracne. Experiments on animals were carried out to determine the substances causing the symptoms. Various substances were applied to the exterior of a rabbit s ear. The 1,2,4,5-tetrachlorobenzene and the 2,4,5-trichlorophenol produced from it were not responsible for the symptoms. Trichlorodibenzofuran, tetrachlorodibenzoburan, and 2,3,6,7-tetrachlorodibenzodioxin which could possibly be formed under the operating conditions were effective in causing the symptoms. Pure pentachlorophenol and pure 2,4,5-trichlorophenol were not effective in causing symptoms on the rabbits.

1899

45251 **APTIC NO. 65051**

Herxheimer, Karl

CONCERNING CHLORINE ACNE. *(Uber Chloracne). Munch. Med. Wochschr. (Munich), vol. 9:278, 1899. Translated from German, 4p.*

A case study is described of a 22-year-old factory worker with skin disease due to exposure to chlorine emitted by the electrolytic dissociation of potassium chloride to form caustic potash. Other workers have shown similar skin modifications due to chlorine acne or tar. The toxic effects of the chlorine on these workers are described. The skin irritation was resistant to most therapy.

EFFECTS-PLANTS AND LIVESTOCK

1974

45252 **APTIC NO. 68122**

Baum, F.

DETERMINATION OF FLUORINE INJURIES ON AN ALLEY OF LINDEN TREES IN THE IMMEDIATE PROXIMITY OF A BRICK KILN NEAR ISMANING BY LEAF ANALYSES AND AERIAL INFRARED PHOTOGRAPHY. *(Ermittlung von Fluorschaeden an einer Lindenalle in unmittelbarer Naehe einer Ziegelei bei Ismaning durch Blattanalysen und Luftaufnahmen in Falschfarbentechnik). Text in German. Gesundh.-Ingr., 95(9):259-263, 1974. 17 refs. (Presented at the Second Symposium on Branch-specific Emissions, Fluorine Emissions by Brick Kilns, Munich, Germany, Feb. 1, 1974.)*

Upon discovery of severe leaf injuries in an alley of linden trees near Ismaning (Munich, West Germany), leaf samples were taken from the lower branches of the trees at three different time periods. The samples were dried, ground, and ashed according to the method by Buck (ashing of 5 g dry substance in a nickel vessel at a temperature of 450 to 500 C in a muffle furnace). The fluorine in the ash was determined by the method of Buck and Stratman. A relationship was determined between the fluorine concentration of the leaves and the location of the tree with regard to a brick kiln close to the alley. The severity of lead necrosis not only corresponded to the determined fluorine concentration but also to the gray tone of the infrared photographs. The results led to the initiation of measures for reduction of the fluorine emissions by this brick kiln.

45253 **APTIC NO. 65560**

Benedict, H. M., D. D. Davis, and A. S. Heagle

DOSE RESPONSES OF VEGETATION TO MINOR AIR POLLUTANTS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1974. 46 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74- 229.)*

Results of literature searches for the effects on vegetation of ammonia, cement-kiln dust, ethylene, chlorine, hydrogen chloride, hydrogen sulfide, and sulfuric acid aerosols reveal sufficient information to recommend an air quality standard only for ethylene designed to protect plants. Levels of fumigation (concentration and time) which would affect plants are found for all pollutants, but sufficient studies have not been made to warrant recommendations for air quality standards based on vegetation effects. In presenting the dose responses of vegetation to the various pollutants, the standard developed based on their effects primarily on humans are also presented. Except for sulfuric acid aerosols and hydrogen sulfide, the exposures which will affect vegetation are less than those considered acceptable for workers in industrial operations.

45254 **APTIC NO. 65486**

Hansen, Jens A. and Jens C. Tjell

TOXOICOLOGIC PROBLEMS OF THE AGRICULTURAL UTILIZATION OF SEWAGE SLUDGE. *(Toksikologiske problemer ved slams slutanbringelse i jordbruket). Text in Danish. In: Hygieniske Problemer Vedrorende Deponering Og Jordbruksanvendelse Av Kommunalt Kloakkslam (I). Nordforsk Miljovardssekretariatet, Arbetsgrupp tor Slamtragor, Rept. 2, p.11-28, 1974. 26 refs.*

Problems of the agricultural utilization of municipal sewage sludge are discussed with respect to their organic and inorganic pollutant contents, with special regard to their cadmium and lead contents. The respective contributions by sewage sludge and atmospheric fallout to the lead and cadmium contents in farmlands on which such sludge is applied are estimated at 5% and 95%, indicating the negligible share of the lead and cadmium supplied by sewage sludge. Only part of the lead and cadmium present in soil, sludge, and atmospheric fallout can be assimilated by plants. Lead intake by the human organism can be lowered by reducing the lead content of sewage sludge to be disposed of on farmlands and in gasoline.

45255 **APTIC NO. 65576**

Hindawi, Ibrahim J. and Hilman C. Ratsch

GROWTH ABNORMALITIES OF CHRISTMAS TREES ATTRIBUTED TO SULFUR DIOXIDE AND PARTICULATE ACID AEROSOL. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1974. 12 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-252.)*

Field surveys are presented of the cause of growth abnormalities of commercially grown scotch pine in West Virginia and Maryland. The abnormalities included short needles, premature needle drop, bud failure, and stunted growth. Five separate studies conducted during the summer of 1970, 1971, and 1972 included: visual examination of diseased and healthy needles to determine if symptoms of air pollution injury were present; exposing sensitive plants to ambient air or carbon filtered air at two sites in the area; exchanging injured trees from a plantation in which many trees were injured with healthy trees from a plantation of healthy trees; grafting of healthy scions to diseased trees and diseased scions to healthy trees to determine if infectious agents were involved; and exposing scotch pine to acid mist during needle growth and development. Native vegetation in the area displayed symptoms of sulfur dioxide injury. The degree of growth abnormalities in the scotch pine decreased with increasing distance from a coal burning power plant, suggesting that sulfur dioxide and/or particulate matter may be related to the growth abnormalities seen. Sensitive plants were injured and their growth suppressed only when exposed to ambient air. Healthy scotch pine moved to a diseased plantation developed some injury and diseased trees moved to a healthy plantation showed some recovery. Grafting experiments indicated that the growth abnormalities were not caused by infectious agents. Controlled exposure in 1972 and 1973 demonstrated reproducible short needle syndrome in scotch pine exposed to sulfuric acid aerosol.

45256 **APTIC NO. 65558**

McCune, D. C., P. J. Temple, and A. M. Witherspoon

ACCEPTABLE LIMITS FOR AIR POLLUTION DOSAGES AND VEGETATION EFFECTS: FLUORIDE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 12p., 1974. 21 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-226.)*

The relationship between the occurrence of atmospheric fluoride and its effect on vegetation is studied to formulate acceptable limits for air pollution and suggest changes in the design and operation of an emission source. Limiting values for the concentration of hydrogen fluoride range from 10 to 5 ppb for 2- to 4-hour peak concentrations, from 0.6 to 0.3 ppb for mean concentrations of periods of 30 to 60 days, and 4 to 1 ppb for daily mean concentrations depending upon the magnitude of diurnal fluctuations and the degree to which days of greater concentration tend to cluster together. These values are derived from experimental fumigations of plants with HF and there are several criteria for their selection. The risk of an unacceptable effect should be low where this risk depends in part upon the susceptibility, size, and function of the plant populations to be protected. Periods for which the limiting concentrations are selected should consider the effects of both short and long term exposures, temporal variability in atmospheric concentrations, and time-dependent changes in the susceptibility of plants to HF. (Author abstract)

45257 **APTIC NO. 65575**

McCune, D. C., D. H. Silberman, R. H. Mandl, L. H. Weinstein, P. C. Freudenthal, and P. A. Giardina

STUDIES ON THE EFFECTS OF SALINE AEROSOLS OF COOLING TOWER ORIGIN ON PLANTS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1974. 9 refs (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-251.)*

A research program was initiated to determine the relationship between concentrations of saline aerosol of cooling tower origin and the risk of injury to indigenous and cultivated plants of the Indian Point, New York area. Chambers and aerosol generating and monitoring apparatus were constructed to allow the exposure of plants to saline particles of expected composition, characteristics, and concentration under controlled environmental conditions. Experiments with 1 micron particles and nine species of deciduous, woody plants indicate that: flowering dogwood and white ash are more susceptible than red maple; witch hazel, white oak, forsythia, black locust, mimosa, or golden rain tree; an increase in relative humidity (RH) from 70% to 85% increases the toxicity of the aerosol to ash and dogwood, and, at a nominal concentration of 2000 micrograms chloride/cu m and at 85% RH, the threshold exposure for injury is about 14 hours for dogwood and ash but above 25 hours for the other species. Results of exposures of pinto beans to saline aerosol greater than 100 micron at 85% RH show that the median effective exposure for producing observable follar lesions is about 1 hour at an apparent concentration of 700-900 micrograms chloride/cu m or deposition rate of 0.35 micrograms chloride/sq cm/min. An increase in the relative humidity from 50% to 85%, either during the exposure period or after it, increases the susceptibility of pinto beans or the toxicity of the saline aerosol. (Author abstract)

45258 **APTIC NO. 65742**

Schoenbeck, Helfried

DETECTION OF HEAVY METAL CONTAINING IMMISSIONS THROUGH SELECTED PLANT INDICATORS. *(Nachweis schwermetallhaltiger Immissionen durch ausgewaehlte pflanzliche Indikatoren). Text in German. Staub, Reinhaltung Luft, 34(6):214-224, June 1974. 23 refs.*

For the detection of heavy metal-containing atmospheric pollutants by existing vegetation, single wild growing trees or bushes are most suitable. The frequently occurring elder was therefore used for determination of the spread of zinc-, lead-, and cadmium-containing pollutants in the western Ruhr area covering roughly 900 sq km. From 44 uniformly distributed locations and a further one outside the industrial Ruhr area leaf samples of elder (Sambucus nigra) were taken and analyzed by stripping voltammetry. The normal concentration was considered as exceeded when values of more than 100 ppm Zn, 10 ppm Pb and 0.5 ppm Cd were measured. The results, of which only excerpts are presented, show that the maximum Zn concentrations at 82% of the locations exceeded the normal value, the maximum Cd concentration exceeded the normal value at 40% of the locations and those of lead exceeded the normal value at all locations. Zinc and lead were found to be wide spread long-term emission components, while Cd was found over longer periods of time in the elder samples only at certain points. In the vicinity of a zinc plant certain test plants were grown under standard conditions and the same soil in the direction of the main wind direction with a control patch on the leeward side. In addition, the soil around the zinc plant was used for cultivation of the indicator plants for the purpose of determining the effects of the dust sediments on the plants. Soil polluted by heavy metal emission increased the sensitivity of plants towards atmospheric effects of air pollutants.

45259 **APTIC NO. 68114**

Sugi, Y., A. Masuda, A. Murata, and H. Yamamoto

EFFECTS OF ENVIRONMENT POLLUTION ON PLANTS: DISTRIBUTION OF EPIPHYTES IN OMUTA CITY. *(Kankyo osen no shokubutsu eikyo - Omuta-shi ni okeru chakusei shokubutsu no bunpu). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 21(10):415, Oct. 1974. (Presented at the Japanese Society of Public Health Annual Meeting, 33rd, Fukushima, Japan, Oct. 16-18, 1974, Paper 545.)*

The species and their coverage of epiphytes on cherry trees, camphor trees, and Irex rotunda were investigated in Omuta City, and the results were transferred to a vegetation map. When the vegetation map was compared to the distribution curves of dust fall in the city, a similar trend was found. A direct relationship between the distribution of epiphytes and the amount of dust fall was not verified; however, an indirect relationship was obtained. The existing method of evaluating air pollution is based on the number of species of epiphytes, and a more sensitive evaluation of environment can be obtained when the type of epiphyte species data can be combined with the amount of plant growth observed.

45260 **APTIC NO. 65559**

Thompson, C. R., D. T. Tingey, and R. A. Reinert

ACCEPTABLE LIMITS FOR AIR POLLUTION DOSAGES AND VEGETATION EFFECTS: NITROGEN DIOXIDE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1974. 32 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-227.)*

Acceptable limits of nitrogen dioxide pollution of air are investigated in terms of effects on vegetation. Plant damages include: acute responses are manifested within 24 hr after 1-2 hr exposure resulting in intercostal bifacial necrotic collapse of leaf tissue similar to the effects of sulfur dioxide; an overall waxy appearance; chronic effects which sometimes appear as an enhancement of green color followed by chlorosis and extensive leaf drop, and physiological effects resulting in altered photosynthesis, stunting, spindly growth, reduced fruit set, or reduced yield. A summary of results obtained by several investigators when plotted on a log-log scale of dosage versus plant response show a fairly good correlation considering the diverse species and experimental conditions used. Chronic injury and accompanying physiological effects initially appear on sensitive plants after 2-4 weeks exposure at 0.15 - 0.26 ppm NO_2. Tobacco and several other crops (radish, soybean, oat, pinto bean) showed injury from 0.1 ppm NO_2 plus 0.1 ppm SO_2 following an exposure of four hours. Sulfur dioxide is synergistic with NO_2 at 5-25 pphm and the combined effect causes injury to field-grown crops, ornamentals, and forest species in the vicinity of many urban areas. (Author abstract)

45261 **APTIC NO. 65380**

Tennessee Valley Authority, Muscle Shoals, Ala., Technical Library

EFFECTS OF ATMOSPHERIC FLUORIDES ON PLANTS AND ANIMALS (1950- 1974). *TVA Bibliography 1061, 11p., 1974. 157 refs.*

References are given on papers discussing the effects of fluorides on plants and animals published from 1950 50 1974.

45262 **APTIC NO. 65381**

Tennessee Valley Authority, Muscle Shoals, Ala., Technical Library

EFFECTS OF AIR POLLUTION ON LICHENS AND BRYOPHYTES (1940-1974). *TVA Bibliography 1294, 3p., June 11, 1974. 33 refs.*

References are presented of papers concerning the effects of air pollution on lichens and bryophytes. The papers were published between 1940 and 1974.

45263 **APTIC NO. 65382**

Tennessee Valley Authority, Muscle Shoals, Ala., Technical Library

SULFUR DIOXIDE EFFECTS ON PLANTS AND ANIMALS (1967-1974). *TVA Bibiliography 1416, 13p., June 14, 1974. 169 refs.*

References are presented for papers concerning the effects of sulfur dioxide on plants and animals which were published between 1967 and 1974.

45264 **APTIC NO. 65663**

Kanto Regional Environmental Protection Headquarters (Japan), Air Pollution Section

INVESTIGATION OF PLANT INFLUENCE BY PHOTOCHEMICAL SMOG. *(Kokagaku sumoggu ni yoru shoku butsu eikyo chosa). Text in Japanese. In: Report of the 1973 Joint Survey on Photochemical Smog in Tokyo and Three Neighboring Prefectures. p. 105-175, April 1974.*

Plant damage due to oxidants was investigated on the third and fifth days of a period of high oxidant concentrations. Spinach, Swiss chard, morning glory, taro, welsh onion, peanut, and maize plants were used as plant indicators. Salting green, Chinese cabbage, tobacco, turnip, Japanese radish, carrot, burdock, and soya plants were used as sub-indicators. Damage critera were: 0 - no damage; 1 - less than 10% of the surface damaged on the most severely damaged leaf; 2 - from 10 to 30% of the surface damaged; and 3 - more than 30% of the surface damaged. Field notes and photographs were taken.

45265 **APTIC NO. 65664**

Kanto Regional Environmental Protection Headquarters (Japan), Air Pollution Section

OUTLINE OF THE REPORT OF COOPERATIVE INVESTIGATION OF PHOTOCHEMICAL SMOG IN THE METROPOLIS AND THREE PREFECTURES IN 1973. *(Showa 48 nendo itto sanken kokagaku sumoggo kyodo chosa hokokusho no gaikyo). Text in Japanese. Preprint, 4p., April 1974.*

On June 23 and July 30, plant damage due to high oxidant concentrations was studied in Tokyo and the surrounding area. Damage appeared on many plants and consisted of bleached spots and necrosis on part or all of the leaf surface and specific silvering and bronzing on the lower surface of relatively unmature leaves, the former due to ozone and the latter to peroxyacetyl nitrate. Damage on June 23 occurred mainly in Tokyo and Kanagawa Prefecture. On July 30, damage occurred only in Saitama Prefecture. Accumulated damage from July 15-18 occurred in Tokyo and the three Prefectures. The area of plant damage coincided almost completely with the area polluted by oxidants at a concentration level of five or more.

45266 **APTIC NO. 65665**

Kanto Regional Environmental Protection Headquarters (Japan), Air Pollution Section

THE PLAN OF A COOPERATIVE INVESTIGATION OF PHOTOCHEMICAL SMOG OF INVESTIGATION OF EFFECTS OF PHOTOCHEMICAL SMOG ON PLANTS IN 1974. *(Showa 49 nendo kokagaku sumoggu kyodo chosa oyobi kokagaku summoggu ni yoru shokubutsu eikyo chosa ni tsuite). Text in Japanese. Preprint, 5p., April 1974.*

The occurrence of photochemical smog danage to plants in the area of Tokyo and three Prefectures in the southern Kanto district now extends to northern Kanto. The effects of smog on plants in Ibaragi, Tochigi, and Gunma Prefectures were studied. Plants were studied from the end of June to early July and in the middle of August at nine points in Ibaragi, 12 in Tochigi, nine in Gunma, 12 in Saitama, 14 in Chiba, 10 in Tokyo, and 12 in Kanagawa. Plants studied include taro, maize, welsh onion, peanut, soya, spinach, Chinese cabbage, Swiss chard, turnip, Japanese radish, and morning glory.

1973

45267 **APTIC NO. 65702**

Miyake, Y. and Y. Uno

STUDIES ON PHYSIOLOGICAL TOBACCO LEAF SPOTS PART VI: RELATIONSHIP BETWEEN THE PHYSIOLOGICAL DAMAGE DUE TO OZONE AND THE STOMATAL APERTURE OF THE LEAVES OF BEL-W3 STRAIN. *(Tabako no seiriteki hanten shogai ni kansuru kenkyu (dai 6 ppo) Bel W3 no ozon ni yoru seiri shogai to kiko kaido tono kanren). Text in Japanese. Utsunomiya Tabako Shikenjo Hokoku (Bull. Utsunomiya Tob. Exp. Stn)., no. 12:61-66, Oct. 1973. 17 refs.*

The relationship between tobacco leaf damage due to ozone and the stomatal aperture was investigated. Leaf discs cut from two strains of tobacco plants, Bel W3-S (highly susceptible to ozone) and Bel W3-R (moderately resistant to ozone), were exposed to ozone-containing air at 50 ppm for 3 min and the apertures of the stomata were measured. After 60 days the stomatal aperture and the number of stomata were larger in the leaves of the Bel W3-S than in Bel W3-R. When the plants were exposed to light after being kept in the dark, the rate of stomatal opening was slower in Bel W3-S than in Bel W3-R and the time required to fully open the stomata was longer in the S strain than in R. At the same level of ozone exposure, the leaf damage was heavier in S than in R. Phenyl mercury acetate and D-sorbitol induced the stomatal closing of the leaf-disc when applied in an aqueous solution during ozone exposure and reduced ozone damage to the leaf. Foliar application of phenyl mercury acetate and D-sorbitol is an effective method for reducing damage due to ozone of tobaco plants.

45268 **APTIC NO. 65715**

Tsunoda, F., E. Aizawa, and S. Sakurai

STUDIES ON AIR POLLUTION DUE TO FLUORIDES, PART II: ON THE FLUORINE CONTENT OF RICE SEEN FROM THE RESPECTIVE SOURCE OF POLLUTION. *(Fukkabutsu ni yoru taiki osen ni kansuru kenkyu -dai 11po- osengen betsu ni mita sanmai chu no fusso ganyuryo ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 20(10 Special Suppl.): 1p., Oct. 1973. (Presented at the Japan Society of Public Health, Annual Meeting, 32nd, Hiroshima, Japan, Oct. 1973, Paper 560.)*

The fluorine content of rice specimens obtained in the fields at various distances in various directions from factories which are regarded as thy major source of fluorine pollution in the air was determined. The fluorine content per ppm of dried specimen were as follows: the average was 0.80 + or - 0.18; the averages of specimens in three areas from four aluminum refineries A, B, C, and D, respectively, within 1 km, 1-2 km, and more than 3 km, were 3.96 + or - 1.85, 2.00 + or 1.07 and 0.93 + or - 0.31; the averages of specimens obtained respectively in the field within 1 km, 1-2 km, and more than 3 km of a pottery manufacturing plant, E, were 7.31 + or - 4.87, 1.55 + or - 0.97 and 0.82 + or - 0.1; the averages of specimens obtained in the field at the same distances as above from four phosphate fertilizer factories, F, G, and H were 1.72 + or - 1.13, 1.12 + or - 0.38 and 0.66 + or - 0.03, respectively; and the average contents of fluorine in rice specimens obtained in the field located 1-2 km and more than 3 km from three iron foundries, I, J and K were respectively 0.94 + or - 0.35 and 0.82 + or - 0.18. The fluorine content of rice appeared in decreasing order, at the same distance, from factories E, A, B, C, D, F, G, J, H, I, K. The rice obtained in the fields near the pottery and aluminum refineries was most polluted bu fluorine. A case was found in which the rice harvested in a field within 1 km of an aluminum refinery contained more than 10 ppm of fluorine. The ratio of gaseous fluoride to water soluble fluoride particle in the air around potteries and aluminum refineries is given.

45269 **APTIC NO. 65736**

Kanagawa Prefecture General Agriculture Research Lab. (Japan)

DAMAGE TO AGRICULTURE PRODUCTS DUE TO PHOTOCHEMICAL POLLUTION. *(Kokagaku kogai no yoru nosakumotsu higai). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yohohama-Kawaski Ind. Area), no. 15:255-258, Feb. 1973*

After a photochemical smog warning issued on April 29 in Sagamihara, Zama, Atsugi, Yamato, and Kawasaki, 122 people developed bodily damages in Kawasaki and Yokohama. Plant damage between May 2 and 8 soon after photochemical air pollution occurred in eight wards where crops such as Japanese leek, spinach, turnip, radish, and green soybean were damaged. Winds blowing southeast to south with a velocity of 2 to 3 m/hr, clear weather, high temperatures, and less and 2 m visibility were common meterological parameters. The oxidant concentration reached the highest point between 1 and 2 pm. Hiratsuka City was severely damaged in the middle part of the city where many Japanese leek sapling turned white in the tip of the leaves and withered. Brown spots appeared between the veins of green soy beans and necrosis often occurred. These crop damages are presumably due to repeated exposure within short time period to oxidants of high concentration. The primary meteorological variable in Hiratsuka City was a northeastern land breeze until 11 am, which shifted to a southwestern see breeze in the afternoon. Visible damages done on the crops increased on the second day after exposure. When exposures last for 3 to 4 hr at the level of 0.15 ppm, for 2 to 3 hr at the level of 0.2 ppm, or for 1 to 2 hr at the level of 0.25 ppm, the rate of damages increases.

1972

45270 **APTIC NO. 65273**

Endelman, Fred J., Melvin L. Northup, Dennis R. Keeney, James R. Boyle, and Richard R. Hughes

A SYSTEMS APPROACH TO AN ANALYSIS OF THE TERRESTRIAL NITROGEN CYCLE. *J. Environ. Syst., 2(1):3-19, March 1972. 18 refs.*

A progress report on a systems approach to the analysis of the terrestrial nitrogen cycle is presented. A mathematical model is being built to analyze and evaluate the role played by soil drainage in the nitrate pollution of groundwaterwater supplies and the eutrophication of the natural waster systems. The model will predict, quantitatively, the effects of nitrogenous fertilizers and of changing land use patterns. The approach is general enough to be useful in analyzing many environmental systems. The systems analysis method is described, and the terrestrial nitrogen cycle which is the basis of the ecosystems to be studied is defined. The framework and basis of the mathematical analysis are described, and some details of the modeling and experimental studies of the soil physics and soil chemistry involved are included. The absorption of nitrogen compounds by plants is mentioned.

45271 **APTIC NO. 65365**

Robinette, Gary O.

PLANTS/PEOPLE/AND ENVIRONMENTAL QUALITY. *American Society of Lanscape Architects Foundation, Washington, D. C., 152p., 1972. 238 refs.*

The ecological and sociological value of plants is reviewed in terms of their functional, architectural, engineering, climatological, and esthetic uses. Oxygenation and dilution are two mechanisms by which plants control air-polluting gases. Particulates are trapped by plants for subsequent washing to the ground. Plants also have the ability to absorb odors directly and metabolize them. Computer modeling studies indicate that 150 ppb of ozone can be reduced by a forest over an 8 hr period to a forst floor level of only 30 ppb. Dust concentrations may range from 10,000 to 12,000 dust particles per liter on streets without trees as compared to 1000 to 3000 dust particles per liter for streets with trees.

45272 **APTIC NO. 65454**

Institut National de la Recherche Agronomique Paris,
Bordeaux (Paris), Lab for the Study of Atmospheric
Pollution

EFFECT OF SO2 ON WHEAT. *Sulphur Inst. J., 8(3):8, 1972.*

A series of experiments were carried out to determine what the effect of accidental exposures of sulfur dioxide would be on a wheat crop. In a wheat field, a number of light plastic air-tight tents were set out, and measured amounts of SO2 injected into the tents. On individual plots, the SO2 treatment was carried out at different stages of growth: sprouting, tillering, flowering, and all three stages. The SO2 treatments lasted for 30 min, the gas being injected in six equal amounts at 5-min intervals to give the determined concentrations. Results at harvest time indicated that the height of the plants and the number of heads were not significantly affected by any of the treatments. Only under the most severe conditions were the yields affected. Necrosis was evident in all treatments and at all concentrations. Treatment at all three growth stages with 189 ppm SO2 resulted in a 40% reduction in 1000-grain weight and a 20% reduction in specific weight.

45273 **APTIC NO. 65728**

Laboratory for Analyzing Fertilizer, Chemical Div., Institute
for Agricultural Sciences, Ministry of Agriculture and
Forestry (Japan) Fertilizer Analysis Lab.

DISTRIBUTION OF SULFUR AND ITS MORPHOLOGY IN PLANTS WHICH HAVE ABSORBED AERIAL SO2 GAS. *(Aryusan gasu o kyushu shita shokubutsu- chu no io no bunpu to keitai). Text in Japanese. Norinsho Nogyo Gijutsu Kenkyusho Nenpo (Ann. Report Inst. Agric. Sci., Minist. Agric., For.), Fiscal 1971:15-20, Dec. 1972.*

The distribution of sulfur dioxide absorbed from stomata of plants in the body of the plant and methods of analyzing the sulfur compounds in the plant were investigated. Potted plants of rice, salting greens, leaf mustard, and soya were exposed to aerial SO2 in concentrations of 0.25, 0.5, 0.3, and 0.8 ppm daily for 5-10 hr until symptoms appeared on the leaves. The ratio of water soluble sulfur compounds to total sulfur was larger in exposed plants than in controls. When the difference of sulfur in exposed plants and in controls was assumed to be the sulfur which came from absorbed SO2 and its water solubility was calculated, it was 75-100%, showing that the sulfur absorbed from stomata as SO2 existed in the plants as water-soluble forms, possibly sulfuric or sulfic acid. The water soluble sulfur had a higher correlation with aerial concentrations of SO2 than total sulfur and it was possible to identify the pollutant by analyzing water-soluble sulfur as well as total sulfur. According to the analytical data of sulfur- containing amino acids in the exposed plants, the intake of sulfur from SO2 to plant protein was largest in salting green (11.5%) and smallest in soya (1.9%), suggesting that the absorbed SO2 changed to water-soluble form and remained in that form for at least 1 wk with a very small amount of intake into plant protein. In another experiment in which tomato, cucumber, soya, Zelkova, and red pine were exposed to 35SO2 for 5 hr at the average concentration of 0.5 ppm, 35S was distributed mainly in growing active leaves, rather than in old leaves and the distribution decreased in the following order: leaf blade, petiole, stem, and root.

1968

45274 **APTIC NO. 65394**

Hindawi, Ibrahim Joseph

INJURY BY SULFUR DIOXIDE, HYDROGEN FLUORIDE, AND CHLORINE AS OBSERVED AND REFLECTED ON VEGETATION IN THE FIELD. *J. Air Pollution Control Assoc., 18(5):307-312, May 1968. 24 refs.*

Plants were examined at three different locations in the eastern part of the U. S. to determine whether damage from air pollution had occurred. Sulfur dioxide damage occurred in New York City; hydrogen fluoride occurred near a glass fiber manufacturing plant in the midwest; and hydrochloric acid mist and chlorine damage from a manufacturing operation occurred in an eastern state. The symptoms that developed in the vegetation were often similar. Chemical and microscopical analyses were helpful in diagnosing the toxicants. Pollutant concentrations were measured in the areas studied. Plant damage from SO2 and/or acid mist results from the conversion of SO2 to sulfur trioxide and then to sulfuric acid. The effects of SO2 in the ambient air were more severe than those produced in the laboratory with the same concentration of SO2 because of an additional chemical reaction attributed to ozone in the ambient air. Sulfur dioxide affected leaves, roots, stems, and plant color. The leaves of gladiolus plants, grown downwind of the fluoride source, were damaged by high concentrations of F in the area. Hydrogen chloride and chlorine levels in the eastern state were higher than concentration thresholds causing plant damage. (Author abstract modified)

1967

45275 **APTIC NO. 65304**

Hall, M. A. and L. Ordin

SUBCELLULAR LOCATION OF PHOSPHOGLUCOMUTASE AND UDP GLUCOSE PYROPHOSPHORYLASE IN AVENA COLEPTILES. *Physiol. Plantarum, vol. 20:624-633, 1967. 15 refs.*

The subcellular distribution of UDP glucose pyrophosphorylase and phosphoglucomutase extracted from oat coleoptiles was investigated to determine the effects and mode of action of ozone and peroxyacetyl nitrate (PAN) upon the enzymes in the constituent fractions. The inhibition of phosphoglucomutase by PAN was confirmed and the enzyme in the subcellular particulate fractions was more inhibited than that in the soluble fraction. The UDP glucose pyrophosphorylase was not inhibited by peroxyacetyl nitrate or O3 in vivo but was inhibited by PAN in vitro. (Author abstract modified)

EFFECTS-MATERIALS

1974

45276 **APTIC NO. 65737**

Ishido, Shosaburo, Yoshikazu, Nakane, Takeji Miyazaki, and Kazumasa Tomofuji

CORROSION OF STEEL PLATES BY AIR POLLUTION. *(Taikiosen ni yoru koban no fushoku ni tsuite). Text in Japanese. Preprint, Japan Society of Heating, Air-Conditioning and Sanitary Engineers, Tokyo, p. 23-27, 1974. 1 ref. (Presented at the Japan Society of Heating, Air-Conditioning and Sanitary Engineers, Kansai Branch, Scientific Studies Presentation Meeting, Osaka, Japan, March 20, 1974.)*

Effects of sulfur dioxide, temperature, and humidity on corrosion of a steel plate were experimentally observed in two test chambers. Weight A is the weight of the sample steel plate before exposure to the specific experimental conditions while Weight B is that measured exposure for 7 days. Weight C is the weight of the steel plate after removing the rust by treating it with a 15.2% hydrogen chloride solution containing an inhibitor to prevent unnecessary removal of iron content from the plate during the rust removal proces. The weight increase or decrease expressed in terms of mg/158 sq cm (the surface area of the steel plate)/7 days was divided by the number of exposure days and the surface area to obtain the corrosion rate (mg/100 sq cm/day). The rate used herein is for the weight increase caused by corrosion. The correlation coefficient for temperature is -0.655. It is 0.565 for humidity, and very high for SO2. The corrosion increases with a higher concentration of SO2 when the humidity is high. A temperature increase results in increased corrosion.

45277 **APTIC NO. 65639**

Kentzler O. and P. Hoff

CORROSION OF A LARGE ALUMINUM ROOF OVER MANY YEARS OF EXPOSURE TO AN INDUSTRIAL ATMOSPHERE. *(Verhalten eines grossen Aluminiumdaches waehrend vieljaehriger Bewitterung in Industrieatmosphaere). Text in German. Aluminium, 50(8):530-532, 1974. 3 refs.*

The congress hall in Dortmund, Federal Republic of Germany bears a 10,000 sq m roof made of 0.7 mm thick 620 mm wide sheets of the alloy AlMn (aluminum-manganese). Ever since its completion in 1952 it has been exposed to an industrial atmosphere which over the measurement period October 1, 1970 to September 30, 1972 measured dust concentrations of 0.65, 1.30 and 2.00 g/sq m day. No dust measurements were taken in the period between 1952 and 1970 but it can be assumed that similar high concentrations prevailed. The layer covering the surface contained iron, silicon, magnesium, and calcium and traces of sodium, titanium, chromium, and copper. Chloride, sulfide, sulfate, and carbonate were below the detection limit. The shining surface of the roof had been changed over the years by the waste gases of the neighboring metallurgical plant, blast furnaces, and coking plant. Over the entire surface a pitted corrosion could be observed. Examinations of the rood two years after completion revealed a depth of the pits of 0.05 mm. The thickness of the oxide layer was 0.25 micron. After 15 years in 1966 it measured between 4 and 25 micron. In 1972 the pits were 0.13 mm deep and it is predicted that the roof will last several more decades.

1965

45278 **APTIC NO. 65305**

Compton, Kenneth C.

FACTORS INFLUENCING THE MEASUREMENT OF CORROSION IN MARINE ATMOSPHERE. *Mater. Prot., 4(12):13-14, Dec. 1965. 3 refs. (Presented at the National Association of Corrosion Engineers, Annual Conference, 20th, Chicago, Ill., March 9-13, 1964.)*

Factors influencing the measurement of corrosion in marine atmospheres are discussed. The American Society for Testing and Materials calibrated a large number of fixed. typical exposure sites classified as marine. The time of wetness, the sulfur dioxide content of the atmosphere, and the amount of chloride deposition were measured. Quantitative data on the variations in corrosion rate of standard metal specimens were qualitatively related to the differences in the conditions encountered. Possible contamination from SO2 and its derivatives was encountered in industrial areas along the ocean and above decks on ships. Sometimes the contamination from sulfur compounds completely obscured the effect of variations in chloride concentration. Prevailing sea breezes and storms could minimize the sulfur contamination.

EFFECTS-ECONOMIC

1974

45279 **APTIC NO. 65526**

Bingham, Taylor

A PROJECTION OF THE EFFECTIVENESS AND COSTS OF A NATIONAL TAX ON SULFUR EMISSIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa. 22p., 1974. 5 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-171.)*

Estimates of the effectiveness and costs of a tax on sulfur emissions were made utilizing a programmed simulation model of the major S emission sources. In the absence of an emission tax or other form of government intervention, S emissions in 1978 are projected to be about 20 million tons annually. The majority of the emissions are from fuel combustion sources. Throughout the range of taxes evaluated (0-30 cents), the emission rate is responsive to the tax. The costs of the S tax consist of both the costs of the induced emission and the tax payments. Both would initially be paid by polluting sources. Both emission standards and emission taxes can be expected to increase the demand for low S fuels. Taxes on S emission induce increases in oil consumption and decreases in coal consumption for steam-electric power-plants and area sources. Increases in abatement costs will reduce the projected effectiveness and raise the costs of a tax on S emissions. Higher prices for residual oil as a result of the energy crisis will result in higher abatement costs than those projected. Using the base prices in the model, a tax of 10 cents, for example, would reduce S emissions by about 74%. However, if oil prices are raised 20% the reduction is 70%. At the same time, abatement costs would increase 20% and tax payments 15%. (Author abstract modified)

45280 **APTIC NO. 65528**

Cannon, James S. and Stephen K. Moody

THE ECONOMIC IMPACT OF POLLUTION CONTROL COSTS ON THE NATION S SEVEN LARGEST STEEL PRODUCERS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 18p., 1974. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-173.)*

The economic impact of pollution control costs on the nation s seven largest steel producers is discussed. The corporations account for almost 70% of domestic steel production and differ in their ability to meet pollution control costs. The Council on Economic Priorities (CEP) devised an extremely simple model, based on the total cost of pollution abatement estimated for the whole steel industry by the President s Council on Environmental Quality (CEQ), which illustrates the possible effects of the cost of cleanup on each of the seven companies. The CEP model provides a rough range of what the effects of expenditures for pollution abatement might be, were they absorbed in either of two ways: through increases in the price of steel, or through decreases in dividends to the steel company shareholders. If the top steel producers were to pass the full costs of pollution control on to their customers, the average annual price increase per ton of steel necessary for the companies to come into compliance between 1972 and 1976 would vary from 1.0% to 1.2% a year. If passed on to the shareholder, the average annual decreases in earning per share could vary from $.38 to $.87 a share. The CEP model is useful to economists working in the field of industrial pollution control who are concerned with the potential burden of abatement costs on specific companies as they work to meet stricter environmental standards. (Author abstract modified)

45281 **APTIC NO. 65508**

Costello, Lawrence S.

PRIVATE ENTERPRISE AND POLLUTION ABATEMENT. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th, Cost. Eff. Environ. Sci., Washington, D. C., 1974, p. 467-471. 13 refs. (April 28-May 1.)*

The purpose of private enterprise is to fulfill a need for goods and services of society. The primary goal is not to maximize profits, as is commonly believed. Rather, the behavior of the private sector is a mirror image of the community from which it derives. Therefore, the responsibility for the current state of the environment must be shared by public and private enterprises. The cost of pollution abatement must be ultimately paid by the consumer. The incremental risk faced by private enterprise during the transition to a cleaner environment will almost surely accentuate the price increases due to the risk-reward perception of business. Price rises caused by the imposition of pollution abatement production costs are likely to lead to fewer goods and services, as well as to higher prices. Cost-effectiveness has equal applicability in the public and private sectors. Differences exist primarily in the need for the private enterprise to deal with profit where the public sector deals with costs. The relative importance of performance measures is also likely to vary, but is it not at all obvious that such a difference in priorities would result in a different choice of an alternate system. A sample cost-effectiveness analysis is given for solid waste disposal. (Author conclusions modified)

45282 **APTIC NO. 65529**

Freas, Warren P., III, Frank A. Collins, and Edwin L. Meyer, Jr.

A METHOD FOR ASSESSING THE ECONOMIC IMPACT OF SULFUR DIOXIDE EMISSION REGULATIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 31p., 1974. 4 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-175.)*

A method for assessing the economic impact resulting from implementation of sulfur dioxide emissions regulations as promulgated in State Implementation Plans (SIPs) is presented. The Energy Quality computerized Model uses a linear programming technique to iteratively solve for the national least cost allocation of fossil fuels within constraints on SO2 emissions, physical capacities, and availability of SO2 control equipment. Although the model was developed to assess the impact of stationary source SO2 emissions regulations on the costs and availabilities of fossil fuels, other applications might include analyses of the impact of new energy sources on fossil fuel costs and availabilities; the impact of varying assumptions on flue gas desulfurization efficiencies and costs; and the impact of transportation capacity constraints on fuel costs. The Energy Quality Model was used to determine the economic impact of SIP compliance in 1975 and to evaluate the effects of granting variances from SIP s for utility coal combustion in selected regions for 1975. (Author abstract modified)

45283 **APTIC NO. 65634**

Hartkopf

THE PRINCIPLE OF POLLUTER PAID ENVIRONMENTAL PROTECTION. *(Das Verursacherprinzip im Umweltschutz). Text in German. Chem. Ind. (Duesseldorf), 26(2):75-79, Feb. 1974.*

The principle of polluter paid environmental protection is not a novel invention. It is common practice in industry that all costs arising through the manufacture of a product are used as basis for calculation of the purchase price. Thus polluter paid environmental protection means integration of all costs for avoidance and elimination of as well as compensations for environmental pollution in the price calculation. Instruments of the principle of polluter-paid environmental protection are emission, construction, and operating standards, and product standards which set limit values for pollutant emissions which may not be exceeded or which determine properties or features of a product. All instruments are defined by governmental regulations. Here it is important that not only the respective state-of-the-art of technical development be laid down but also long-term goals for which there are guarantees that they can be accomplished by the industry. In addition to the integration of costs for environmental protection, standards for the residual risk must be set. The new draft of the technical directives for the maintenance of clean air is a step in the right direction here. It recommends the collection of a fee according to the quantity of pollutants emitted. The magnitude of the fee depends on the existing environmental quality standards and on the average recovering capacity of the environment.

45284 **APTIC NO. 65011**

Hedley, William H.

EFFECT OF GAS TURBINE EFFICIENCY AND FUEL COST ON COST OF PRODUCING ELECTRIC POWER (FINAL REPORT). *Monsanto Research Corp., Dayton, Ohio, Environmental Protection Agency Contract 68-02-1320, Task 2, Program Element 1AB013, ROAP 21ADE-08, Rept. EPA-650/2-74-041, Rept. MRC-DA-434, 34p., May 1974. 8 refs.*

NTIS: PB 234159/AS

Gas turbine efficiencies which will be needed to produce power in a combined cycle gas turbine-steam turbine system (COGAS system) at costs from 6 to 10 mils/kwh are tabulated as a function of fuel cost from 40 to 100 cents/million Btu. Improvements in gas turbine efficiency from 29 to 37% are envisioned over the next 9 years, which would result in combined cycle efficiencies from 42 to 54%. The research improvements which would improve the efficiency of the gas turbine are primarily those which will increase the temperature at which the gas turbines can operate. The level of effort needed to increase the operating temperatures at this rate is expected to be an additional 3-8 million dollars/yr for research studies. Combined with other work being done by the gas turbine manufacturers, this effort could be expected to increase the turbine inlet temperatures by an average of 90 F/yr, which is enough to increase gas turbine efficiency at the rate of almost 1%/yr. (Author summary modified)

45285 **APTIC NO. 68131**

Kertcher, Larry F. and Benjamin Linsky

ECONOMICS OF COKE OVEN CHARGING CONTROLS. *J. Air Pollution Control Assoc., 24(8):765-771, Aug. 1974. 11 refs.*

A study was undertaken to determine which of several alternative air pollution abatement systems affords the most economical solution to the control of atmospheric emissions during the charging of coal into by-product coke ovens. The study was limited to the consideration of existing by product batteries, and the assumption was made that no coking plant has the alternative to do nothing nor will the plant choose to delay abatement through legal procedures. The data indicate that a jumper pipe installation with a new Larry Car provides the most economical control method for retrofitting coke oven batteries. Based on January 1973 prices, the capital cost of this method is $2,690,000 or an annualized cost of $297,400. This represents an increased cost of coke of $0.24/ton. Added to the price of coke in January 1973 of $30, this represents less than 1% added to the cost of coke. This method and the others that were studied (full enclosure, American Iron and Steel Institute charging system, dual collecting main installation, Larry Car Scrubber system, pipeline charging) provide for complete control of air pollution emissions which normally result from the charging of coal. The modification of an existing battery for a venturi scrubber system without a new Larry Car was nearly as economical as the jumper pipe installation. Alternatives relating the new Larry Car with new equipment plus a reduced labor force to limited modifications of the existing Larry Car vividly point out the economics of mechanization. It is expected that most firms will opt to modify Larry Cars without their employee environmental units and modern communications systems to hold capital costs to a minimum. Pipeline charging for retrofitted installations appears to have prohibitive annualized costs at present. In a new installation, a pipeline system could have a capital cost approximately 10% less than conventional current uncontrolled ovens of equivalent capacity. (Author summary modified)

45286 **APTIC NO. 65731**

Popa, Rodica S.

METHODS FOR DETERMINING THE NEED FOR AIR POLLUTION PREVENTION BY COMPARISON WITH THE MAXIMUM ALLOWABLE POLLUTANT LEVELS. *(Modalitati de determinare a necesarului de protectie impotriva poluarii aerului prin comparare cu limitele admisibile ale noxelor). Text in Polish. Energetica (Bucharest), 22(3):92-95, 1974.*

Various methods for determining the need for costly air pollution controls by comparison with the maximum allowable pollutant levels are discussed. The main pollutant is sulfur from thermal power plants. It is necessary to determine the pollution sources in every city, agree on the technology used for the respective types of pollution, and establish prevention priorities. A cost benefit analysis based on air quality indices and maximum allowable concentrations is given. The sulfur content in the air should be reduced by approximately 30% in order not to exceed the standards. This method has disadvantages: the control stations register locally, and cannot register the real maximum concentration; sometimes a protection level higher than the needed one is requested, leading to unnecessarily high expenses; and no 30% reduction is possible, since pollutant concentrations of sources have already been reduced to a maximum degree. Another method is based on individual treatment of the effects of each of the sources upon the air in a certain area, and summing up all those effects into a total. When the model was applied to real cases, differences existed between the calculated and measured concentrations, due to various reasons. All pollution prevention methods imply nonproductive expenses on installations concerning pollution reduction, fuel replacement, transfer of energy producing installations, and funds allocated for research. In advanced countries, these expenses lead to an increase in the cost of producing electric energy. The investments concerning pollution reduction have soared from 2 to 11% of the total cost of modern power plant construction. Management of air pollution control and prevention necessitates international cooperation and exchange of specialists and information.

45287 **APTIC NO. 65530**

Sievering, Herman and S. A. Wulf

ECONOMIC AND ENERGY COST OF DECREASED ILLUMINATION CAUSED BY POLLUTANT AEROSOLS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 28p., 1974. 19 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-177.)*

The economic and energy costs of decreased illumination caused by pollutant aerosols were determined. Two methods developed for analyzing the effect of aerosols on the transfer of solar energy through realistic urban atmospheres are reviewed. A physical model was used to determine a minimum effect independent of any subjective human response scale. Minimum economic costs by this method of calculation suggest at least $100 million annual costs to residential home owners due to increased illumination needs. This annual cost is equivalent to almost 0.25% of the electrical energy used in this country. A second method of calculation which uses the prevailing visibility as a measure of diminished natural illumination suggests that as much as 1.0% of electrical energy is consumed because of pollution. One percent of the electrical energy use is equivalent to 0.09% of the total national energy use and to a 1/2 billion dollar cost nationwide to the private consumer. (Author abstract modified)

45288 **APTIC NO. 65616**

Yamamoto, Yasuyuki

INVESTMENTS IN POLLUTION CONTROL EQUIPMENT. *(Kogai boshi setsubi toshi ni tsuite). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), 3(7):46-52, July 1974.*

The status of non-governmental investment in pollution control equipment from 1965 to 1974 is given in tabular forms. The total expenditures are $1.25 billion for 1972, $2 billion for 1973 (estimation) and $4 billion for 1974 (estimation). The figures are given according to industrial classifications, number of industrial establishments involved, and yearly rate of increase in the amount of investment. Of the total investment for 1974, 60.7% is spent for air pollution control, 20.8% for water pollution control, 3.6% for noise and vibration pollution control, 5.7% for industrial refuse treatment, and 9.0% for other pollution control facilities. The heavier investments made in air pollution control are 93.7% in cement manufacture, 87.7% in petroleum refining, 87.5% in electric power production, and 82.5% in ceramic industries. For water pollution control they are 58.2% in paper pulp manufacture, 39.4% in textile manufacture, 35.4% in machinery production, and 33.2% in petrochemical industries. Substantial increases in both the amount of investment and investment rate are shown particularly by the petroleum, electric power, and chemical industries.

1973

45289 **APTIC NO. 65379**

Kliewer, Donald E.

WHAT YOU SHOULD KNOW ABOUT FEDERAL VS. CALIFORNIA AUTO EMISSIONS STANDARDS. *World Oil, 1973:83-85, April 1973. 7 refs.*

The cost of environmental protection will become certain after Federal standards on automobile emissions take full effect. The cost of achieving U. S. requirements will be much greater than anticipated. The cost of meeting Federal standards is estimated to be $500/car by 1970, compared to the estimated $290/vehicle to meet California standards. Thus, based on current sales of 10 million cars a year, using the California standards rather than the Federal standards could save car owners $2 million or more in car costs in 1976 and in each subsequent year. Emission controls and necessary engine modifications will have the net effect of increasing fuel consumption. Additional crude oil and more expensive processing will be required to produce phosphorus- and lead-free gasoline for use in catalytic converter-equipped automobiles. Thus, gasoline will cost more to the consumer. The estimated added costs of meeting the Federal rather than the California standards are $390/vehicle plus maintenance costs, 1.2 million additional barrels of crude oil drained each day from the world s dwingling petroleum supplies, and $2.8 billion lost annually in the U. S. balance of payments.

45290 **APTIC NO. 65308**

Siegel, Howard M.

THE COST AND COMMERCIALIZATION OF GAS AND LIQUIDS FROM COAL. *Inst. of Gas Technology, Chicago, Ill., Clean Fuels Coal, Proc. Symp., Chicago, Ill., 1973, p. 653-661. (Sept. 10-14.)*

The costs, economics, and commercialization of coal gasification and coal liquefaction are presented. The economic basis for cost of SNG from coal is discussed in terms of plant capacity, plant service factor, cost price, operating labor, financing, and escalation rates. In the intermediate BTU Gas Process (330-500 BTU/SCF), the raw product gas from the gasification step in SNG process is scrubbed to remove H_2S. This eliminates CO_2 scrubbing and methanation, which saves investment and energy. In the Lower BTU Gas (150-250 BTU/SCF), air is injected directly into the gasification reactor. The low BTU gas contains 40-50% nitrogen. The gas is scrubbed to remove H_2S (no CO_2 scrubbing or methanation). It saves the cost of an air separation plant. The cost of lower BTU gas (from deep-mined bituminous coal) can vary widely from 30-50 cents/mm BTU less than SNG to a cost greater than SNG. In coal liquefaction, the process is the chemical reaction of coal with hydrogen at high temperature and high pressure. The major products include light hydrocarbon gases, a full range of hydrocarbon liquids, and a mixture of solid materials composed of the coal ash and unreacted coal particles. The yield of liquids is 2-3 barrels per ton of total dry coal feed. In a comparison of gas and liquids costs from coal, coal has essentially the same cost in $/MMBTU if the plants are financed on the same basis. The Fischer-Tropsch Synthesis and Coal Pyrolysis techniques are discussed as having future application. Commercialization of coal liquefaction is a necessary development and efforts toward use of this process need to be accelerated.

1972

45291 **APTIC NO. 65488**

Burleigh, John R.

WET SCRUBBING FOR FLY ASH AND SO_2 CONTROL FOR FOSSIL FUELED POWER GENERATING STATIONS. *American Assoc. of Cost Engineers, Am. Assoc. Cost Engrs., Natl. Meet., 16th, Trans., Liberty, N. Y., 1972, p. 63-66. (June 25-28.)*

Wet scrubbing can be used to control fly ash and sulfur dioxide emissions to meet new emission standards for steam power plants. Many wet scrubbing systems have been used in chemical and other industries over the year. It is difficult to draw simple curves of control system costs versus megawatt rating with any degree of accuracy for a complete pollution control system. Final costs depend on the selection of optional extras for the base units. Base unit costs are $0.80-1.0/ACFM for fly ash removal only, $0.70-0.90/ACFM for SO_2 removal, and $1.80-2.20/ACFM for fly ash + SO_2. A flow system is presented for a magnesium oxide scrubber system for oil-fired boilers.

45292 **APTIC NO. 65306**

Katell, Sidney

AN ECONOMIC EVALUATION OF PIPELINE GAS FROM COAL. *Gas, 48(8): 32-34, Aug. 1972. 4 refs. (Presented at the American Association of Cost Engineers, Annual Meeting, Grossingers, N. Y., June 26-28.)*

An economic evaluation was made of a plant sized and designed to produce 250 MM scfd of high Btu gas using Pittsburgh seam coal. A fluidized gasification system followed by shift conversion, purification, and single stage tube wall methanation is used to produce 927 Btu gas. Gas leaving the gasifiers has entrained dust consisting of ash and unburned carbon plus the tar produced in the low temperature section of the gasifiers. These entrainments must be removed prior to shift conversion. Solids are removed in cyclone separators and tar by water scrubbing. The total capital investment is estimated to be $194,606,200 or 78 cents per daily scf of gas production capacity. Based on a 330 day operating year for the plant and allowing credit for the sulfur and tar produced, the average selling price of the gas will be 67 cents, 79 cents, and 90 cents per Mscf of product for $4, $6, and $8 coal respectively.

1971

45293 **APTIC NO. 65279**

Gaskell, Peter

POLLUTION: CLEANING UP COSTS MONEY. *Vision, no. 13:28-34, Dec. 1971.*

The economic and legal problems associated with pollution control on an international level are discussed. Environmental polluters are not limited to industry, municipal wastes and domestic heating are heavy contributors. Pollution control is costly, anti-pollution equipment in new plants can increase costs from 3-12%, while costs escalate for older plants. Medium size and small firms can be forced to close because of anti-pollution legislation. The cost of purifying effluents rises rapidly with the degree of purification. The automobile industry is faced with rising costs to meet U. S. anti-pollution standards. Production costs are up 6% in Italy and 5% in Germany. An international anti-pollution agreement will take years to achieve. The European Economic Commission has a plan to limit pollution without restricting economic growth. The plan covers pollution measurement standards, limits, and control methods, and proposes the setting up of a European environmental institute.

STANDARDS AND CRITERIA

1974

45294 **APTIC NO. 65556**

Bruckman, L. and R. A. Rubino

RATIONALE BEHIND A PROPOSED ASBESTOS AIR QUALITY STANDARD. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 23p., 1974. 46 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-222.)*

This paper presents a proposed asbestos air quality standard and the rationale utilized in its formulation. The criterion of mesothelioma has been selected as the basis for developing the subject standard. A concentration mesothelioma incidence envelope has been constructed for the general population, based on mesothelioma incidences due to industrial exposure. An ambient air quality asbestos standard of 30 nanograms/cu m, based on a 30-day average sample is recommended. This standard is projected to result in 150 nationwide fatalities. Available ambient air asbestos data indicates that non-urban and remote non-urban areas have asbestos levels typically less than 1 nanogram/cu m while urban areas are usually below 30 nanograms/cu m. Dispersion calculations are used to determine the maximum allowable asbestos mass emission standard for manufacturing sources (24 g/day) and a maximum allowable average asbestos concentration (25 micrograms/cu m). A family of curves for various workdays depicting the average allowable asbestos concentration as a function of total asbestos contaminated exhaust flow rate, consistent with the 24 g/day emission standard are presented. A preliminary asbestos stack sampling train has been developed requiring electron microscopy as the analytical procedure to be used to determine the simple asbestos content. The implementation of the proposed emission standard will lower the expected annual asbestos emissions from manufacturing operations in Connecticut to below one ton compared to the 10 tons emitted if the Federal

EPA asbestos regulation is accepted. The proposed air quality standard will further reduce Connecticut asbestos-related fatalities to only two persons annually. (Author abstract modified)

45295 **APTIC NO. 65225**

Curran, Thomas C. and William F. Hunt

INTERPRETATION OF AIR QUALITY DATA WITH RESPECT TO THE NATIONAL AMBIENT AIR QUALITY STANDARDS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1974. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-78.)*

The problem of interpreting air quality data with respect to the National Ambient Air Quality Standards (NAAQS) is presented for those responsible for evaluating compliance with the NAAQS. A series of diverse topics that relate to frequent questions concerning the comparison of air quality data with the standards is examined. Basic conventions regarding significant features are indicated as well as more detailed discussions concerning the averaging times employed in comparing air quality data with particular standards. The distinction is made between two general categories of standards: annual mean standards and once-per- year standards. Conventions concerning the determination of compliance for both types of standards are discussed as well as statistical factors affecting inferences made in these evaluations. In particular, the influence of sampling frequency upon the results is examined. Recommendations are made concerning each major point and the relative merits of these suggestions are indicated. (Author abstract modified)

45296 **APTIC NO. 65157**

Japan Environmental Agency, Environmental Protection Bureau

ESTABLISHMENT OF MAXIMUM ALLOWABLE EMISSION FOR HYDROCARBONS AND DIESEL BLACK SMOKE FOR USED CARS AND NITROGEN OXIDES EMISSIONS FOR NEW DIESEL CARS. *(Jizeru shinsha no chisso sankabutsu to no haishutsu gasu narabi ni shiyo kateisha no tanka suiso oyohi). Text in Japanese. Kankocho Kogaisemnon Shiryo (Public Nuisance Gaz.), 9(4):96-97, July 1974.*

Emission standards for nitrogen oxides, carbon monoxide, hydrocarbons, and black smoke for new diesel engines using light oil as fuel are given; those for HC and CO from used cars using gasoline or liquefied petroleum gas as fuel are also given. Exhaust gases from new diesel engines are analyzed at 6 modes. The HC from used cars are measured at idling speeds, and black smoke is measured at acceleration without loading. The emission standards for new diesel engines are: CO, 980 ppm; HC, 670 ppm; and NOx, 1000 ppm for jet type and 590 ppm for the others. The emission standards for used cars are: black smoke (particulates), 50% for diesel engine and HC, 7800 ppm for 2-cycle gasoline or LPG engine, 3300 ppm for special engines, and 1200 ppm for the others. It is aimed at reducing 5% of the total CO, 10% of the total HC, and 20% of the total NOx.

45297 **APTIC NO. 65633**

REINFORCEMENT OF AUTOMOTIVE EMISSION GAS REGULATIONS. *(Jidosha haishutsu gasu no kisei o kyoka). Text in Japanese. PPM (Japan), 5(8):61-73, Aug. 1974.*

From February 1971, the municipal government has suggested the use of catalytic recombustion device in any vehicle with a gasoline engine having a capacity of more than 1800 cc and in vehicles with an LPG engine having a capacity of more than 1600 cc. The municipal government has purchased low polluting vehicles for public use. New emission standards for 1975 were set as follows: passenger cars with 4-cycle gasoline and LPG engines, carbon monoxide 2.7 g/km and 85.0 g/test, nitrogen oxides 1.6 g/km and 11.0 g/test, hydrocarbon(HC) 0.39 g/km and 9.5 g/test by 10 and 11 modes test methods, respectively; passenger cars with 2-cycle gasoline engines, CO 2.7 g/km and 85.0 g/test, NOx 0.5 g/km and 4.0 g/test, HC 0.39 g/km and 9.5 g/test, respectively; light buses with 4-cycle gasoline and LPG engines, CO 17.0 g/km and 130 g/test, NOx 2.3 g/km and 20.0 g/test, HC 2.7 g/km and 17.0 g/test by 10 and 11 mode test method, respectively; and light trucks with 2-cycle gasoline engine, CO 17.0 g/km and 130.0 g/test, NOx 0.5 g/km and 4.0 g/test, and HC 15.0 g/km and 70.0 g/test, respectively. The total emissions of CO, NOx and HC in 1980 are expected to be reduced from 867 k ton/year to 102 k ton/year, 211 k ton/year to 8 k ton/year, and 107 k ton/year to 20 k ton/year, respectively.

1973

45298 **APTIC NO. 65015**

Japan Environmental Agency, Bureau of Atmospheric Safety

CONCERNING THE BASIS FOR THE CRITERIA (CONCENTRATION CONDITIONS WHICH OUGHT TO BE MAINTAINED FOR PROTECTING HUMAN HEALTH) PROPOSED BY THE COMMITTEE OF SPECIALISTS FOR ENVIRONMENTAL STANDARDS CONCERNING SULFUR OXIDES. *(Io sankabutsu ni kakaru Kijun Senmon Iinkai no teian shita hantei joken (hito no kenko wo hogo suru ue de iji sarerubeki nodo joken) no konkyo ni tsuite). Kankyo Hoken Reporto (Environ. Health Rept.), no. 22:57-58, July 1973. Translated from Japanese, 8p.*

A Committee of Specialists reviewed human and animal experiments concerning the effects of sulfur dioxide, epidemiological surveys, and other data to formulate environmental standards for SO2. The results of their review and their conclusions are discussed. The proposed 24-hour standard was 0.04 ppm, somewhat stricter than the previously proposed standard because of consideration of prevention of the occurrence of infantile asthma and prevention of adverse effects on patients with chronic respiratory diseases. To prevent acute effects, the proposed hourly standard was 0.1 ppm, which was the same as the previously proposed value. No annual mean values were proposed, because if the 24-hour value was less than 0.04 ppm and the hourly value less than 0.1 ppm, the annual mean value would automatically be 0.012-0.015 ppm or less.

1972

45299 **APTIC NO. 65018**

PREPARATION OF INSTRUCTIONS CONCERNING POLLUTION CONTROL OF THE AIR IN VARIOUS INDUSTRIAL DIVISIONS. *(Elaboration des instructions relatives a la lutte contre la pollution de l air dans diverses branches industrielles). 1972 (?). (Source not indicated.) Translated from French, 4p.*

A method for determining emission standards in various industries is described. Emissions can be expressed in several ways: as the weight of dust/ton of produced product or as the weight of dust/cu m of gas emitted. Limiting values for pollutant concentrations must consider the size of the plant, the nature of the waste gases, and the proximity of residential areas. In the case of hot, dust-laden gas emissions it is necessary to provide for dust emission thresholds which are a function of the plant capacity. Thus, sometimes the maximum dust concentration decreases from 1 to 0.15 g/N cu m for a gas output from 0 to 50,000 N cu/m/hr. Waste standards also consider the nature of the dusts, their color and toxicity. The emission of visible fumes produces a specific psychological effect. The emission standard for dusts without coloration and toxicity is 0.15 g/N cu m, the visibility threshold for these dusts. The threshold has been lowered to 0.12 g/N cu m for steelwork fumes. For harmful dusts, the standard takes into account the control methods available. The location of the plant is also an important factor in determining emission standards.

1971

45300 **APTIC NO. 65021**

RECOMMENDATION FOR PERMISSIBLE CONCENTRATIONS, ETC. (1971). *(Kyoyo nodo to no kankoku (1971 nen)). Sangyo Igaku (Japan. J. Ind. Health), 13(5):475-484, 1971. 19 refs. Translated from Japanese, 40p.*

Recommendations are given for permissible concentrations of various pollutants for industrial exposures. A description is given of the way the standards are to be used. Some of the substances whose standards are given include acetone, ammonia, carbon monoxide, isoamyl alcohol, isopropyl alcohol, ethyl methyl ketone, vinyl chloride, chlorine, ozone, gasoline, xylene, chromium, chloroform, amyl acetate, zinc oxide fume, ethylene oxide, cadmium oxide, arsenic oxide, hydrogen cyanide, carbon tetrachloride, cyclohexane, bromine, nitric acid, mercury, styrene, selenium compounds, lead, nickel, sulfur dioxide, nitrogen dioxide, vanadium compounds, hydrogen fluoride, beryllium, benzene, phosgene, formaldehyde, methanol, iodine, hydrogen sulfide, sulfuric acid, dust, and many others. The chemical formula, permissible concentration (in ppm and mg/cu m), and date of decision or revision are given. An appendix is given on the standard method for the measurement of dust, noise and high temperature standards, carbon monoxide standard, and mercury standard.

LEGAL AND ADMINISTRATIVE

1974

45301 **APTIC NO. 65511**

Austin, John H. and Wesley O. Pipes

EDUCATIONAL NEEDS IN ENVIRONMENTAL ENGINEERING. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th, Cost Eff. Environ. Sci., Washington, D. C., 1974. p. 492- 503. 7 refs. (April 28-May 1.)*

Environmental engineering is concerned with the protection of human populations from the effects of adverse environmental factors, the protection of both local and global environments from the potentially deleterious effects of human activities, and the improvement of environmental quality for mans health and well-being. This includes activities concerned with air, water, waste water, solid waste, radiation, and hazardous materials. The activities include environmental impact assessment and design and management in the transport and control of pollutants. Environmental engineers, supported by technologists and technicians, have a major role to play in envirionmental engineering. Career opportunities and instructional programs are suggested for each. A four-year waste water technology curriculum, a four-year environmental engineering technologist curriculum, and a two-year environmental engineering technical curriculum are suggested.

45302 **APTIC NO. 65510**

Berryman, Matilene S.

CAREERS IN ENVIRONMENTAL SCIENCE TECHNOLOGY. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet,, 20th, Cost. Eff. Environ. Sci. Washington, D. C., 1974. p. 487-491. (April 28-May 1.)*

Various environmental problems and the need for new technology have led to the need for more training in the fields of environmental health, environmental engineering, air pollution monitoring, water pollution and marine science, and environmental management. The community college and technical schools can provide some training, as well as secondary schools and colleges. Biology, botany, zoology, ecology, chemistry, physics, and mathematics are areas involved in environmental sciences.

45303 **APTIC NO. 65388**

Brinn, D. G.

A REVIEW OF THE LITERATURE CONCERNING THE STEEL INDUSTRY AND POLLUTION. PART I. THE BACKGROUND TO POLLUTION. *British Steel Corp., Sheffield (England), Strip Mills Div., SM/BIB/832, 24p., 1974 (?). 109 refs.*

The extent of air pollution and its control are reviewed on an international level. Developments in pollution legislation, with particular regard to the United Kingdom, are traced, and some comparison is made with the situation in other industrial countries. In the United Kingdom the only comprehensive nationwide surveys of air pollutants cover sulfur dioxide and smoke, although there are estimates for nitrogen oxides, carbon monoxide, and hydrocarbons. There are no nationwide surveys for pollutants in the United States or Western Germany but there are estimates for particulates, SO2, NOx, CO, and hydrocarbons. Future pollution levels will be determined by the tightness of anti-pollution legislation, advances in anti-pollution techniques, and the rate of increase in the demand for energy.

45304 **APTIC NO. 65389**

Brown, G. A., V. C. Rose, S. F. Bartlett, A. Romano, and R. Gularte

POWER PLANT SITE CONSIDERATIONS AT CHARLESTOWN, RHODE ISLAND. *Rhode Island Univ., Kingston, Ocean Engineering Coastal Resources Center, Marine Technical Rept. Ser. 23, 47p., 1974. 44 refs.*

Power plant sites in Rhode Island are discussed including the siting for the Charlestown Plant. Existing Atomic Energy Commission (AEC) and Environmental Protection Agency (EPA) criteria were applied to a group of power plant sites to determine if Rhode Island had sufficient plant sites. Other limitations on the siting of plants included availability of land, auxiliary equipment, and cooling water. The siting criteria were arranged in six categories: land availability including sulfur dioxide removal equipment, water availability, public health and safety, effects on marine ecology, effects on land ecology, and general site considerations.

45305 **APTIC NO. 65547**

Connolly, Thomas W., William J. Veigele, Richard C. Burriss, and Edith A. Briggs

ENVIRONMENTAL IMPACT STATEMENT FOR A POWER PLANT NEAR COLORADO SPRINGS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 23p., 1974. 1 ref. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-207.)*

The environmental impact of a power plant in a medium sized western city located in a semi-arid climate and possessing limited water resources is described using the city of Colorado Springs as an example. The selected power plant site is intended for multiple land use activities, with city facilities located in a large area withdrawn from commercial use. Fuel consumption rates provided the basis for calculating gaseous and particulate emission from the stacks. A Gaussian plume model for an elevated source was used to predict the concentration of air pollution produced in the vicinity of Colorado Springs. All calculations were made assuming maximum emission rates of 0.1 lb/million BTU heat input for particulate matter, 150 ppm sulfur dioxide, and 0.7 lb/million BTU heat input nitrogen oxides. An electrostatic precipitator is required as well as some form of flue gas scrubber or other device to reduce SO2 emission. Nitrogen oxide emission will probably not exceed legal limits. An effective stack height of 500 ft will produce the Colorado maximum legal concentration of SO2 of 10 micrograms/cu m on the ground. All other pollutants are below legal maximum concentrations under these conditions.

45306 **APTIC NO. 65555**

Cullen, James J., Theodore V. Flaherty, Jr., and Stanley M. Barnett

INDICES FOR DISSEMINATION OF AMBIENT AIR QUALITY INFORMATION TO THE PUBLIC. *Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1974. 13 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-221.)*

A series of indices for the major air pollutants (carbon monoxide, particulate matter, sulfur oxides, nitrogen oxides, and photochemical oxidants) equating pollutant concentrations to readily understandable physical quantities is presented. The indices propose to translate the extremely complex subject of air pollution into a highly simplified model, which the general public can readily grasp. Current indices for public dissemination of air quality data prove to be either too technical for the public to comprehend, or too abstract to give physical significance to the true status of the ambient air condition. While it may be argued that the indices tend to oversimplify and inaccurately describe a very complex subject, simplicity, it turns out, is the required criterion for a public air quality index to succeed. The proposed indices maintain accuracy to the degree, and in a form, which the public can readily comprehend. (Author abstract)

45307 **APTIC NO. 65507**

Darby, William P., Paul J. Ossenbruggen, and Constantine Gregory

PLACEMENT OF SAMPLERS IN AN AIR MONITORING NETWORK. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th, Cost. Eff. Environ. Sci., Washington, D. C., 1974, p. 326-335. 36 refs. (April 28-May 1.)*

A uniform method for siting samplers in an air monitoring network is necessary. To accomplish this, it is necessary to have a measure of system effectiveness consistent with the objectives of the air monitoring program. The objective of the air monitoring program, required by the Environmental Protection Agency to implement the Clean Air Act of 1970, is to determine the dosages of air pollution to which the population is exposed. A probability function which rationally measures and compares the effects of pollution on the population is introduced as a measure of system effectiveness. A linear programming mode, which locates sampling sites based upon maximizing the probability of measuring concentrations which contribute to significant health hazards, is utilized. Reduction in the investment level can be effected under EPA guidelines chiefly by minimizing the number of sampling sites through which the prescribed number of samplers is distributed. The EPA guidelines specify the air monitoring network as a fixed cost system. The numerical results obtained by applying the model to the Metropolitan Boston area indicate that minimizing the cost of the air monitoring network with eight samplers each for particulates, sulfur dioxide, and oxides of nitrogen, as prescirbed by EPA guidelines, provides an insignificant decrease in effectivenss from unconstrained optimization. Examination of the cost-effectiveness curve indicates diminishing marginal returns as the investment level increases. This characteristic indicates that specifying an air monitoring network as a fixed cost rather than as a fixed effectiveness system may not represent cost-effective environmental control. (Author summary modified)

45308 **APTIC NO. 65685**

DeFalco, Paul, Jr.

VEHICLE EMISSION CONTROLS. REVIEW OF INDIRECT SOURCES IN NEVADA. *Federal Register, 39(149):27811, Aug. 1, 1974.*

The availability of the Nevada State Implementation Plan including regulations to provide for the review of indirect sources is announced. The regulations are under review, and if they meet all the Environmental Protection Agency requirements pertaining to the review of indirect sources, the disapproval of the Nevada plan for not complying with those requirements and the EPA promulgation providing for the review of indirect sources in Nevada will be revoked. Public comment is invited.

45309 **APTIC NO. 65265**

Edmisten, Norman G., Martin Massoglia, and Lee Downie

FEDERAL REGULATORY STRUCTURE FOR MAINTENANCE OF NATIONAL AMBIENT AIR QUALITY STANDARDS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 28p., 1974. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-142.)*

The Federal regulatory structure for maintenance of national ambient air quality standards (NAAQS) is described. On June 18, 1973, the Environmental Protection Agency published amendments to its regulations for preparation of state air implementation plans (SIPs) designed to insure that once the NAAQS are attained, they will be adequately maintained in the future. The amendments require that SIPs be revised to include essentially a two-phase approach toward maintenance of standards. The first phase involves the review of new or modified indirect sources to determine if the associated motor vehicle activity would interfere with attainment or maintenance of a NAAQS. The second phase to be completed by June 1975, involves: the designation of air quality maintenance areas; an analysis of those problems to qualify and quantify the problem; and development of program to ensure that the NAAQS will be maintained in the documented maintenance area. The background and rationale for these requirements, guidance for implementing these requirements, and the institutional arrangements that must be considered and involved in an effective maintenance program are discussed. (Author abstract modified)

45310 **APTIC NO. 64982**

Effenberger, Helmut and Josef Koch

CRITERIA FOR THE SELECTION OF SITES FOR POWER PLANTS WITH REGARD TO THE REQUIREMENTS FOR ENVIRONMENTAL PROTECTION. *(Gesichtspunkte fuer die Festlegung von Kraftwerksstandorten unter Beruecksichtigung von Bedingungen fuer den Umweltschutz). Text in German. Energietechnik, 24(7):289-292, July 1974. 6 refs.*

In a highly industrialized and densely populated country like the German Democratic Republic the selection of new sites for new power plants requires intense study. A detailed investigation of the technical and economic criteria is required covering fuel source, the distance to the suitable construction site, availability of water, conditions for energy transport, effects on the environment, accessibility, availability of living quarters for the workers, availability of work force, transportation distances for the construction material, and aspects of national defense. With the aid of the methods of systematic heuristics a guideline to the selection of suitable sites for power plants has been created which proceeds in two steps. This approach permits an objective comparison of various sites with each other.

45311 **APTIC NO. 65227**

Faith, W. L.

AN EVALUATION OF FUGITIVE DUST REGULATIONS. *Preprint, Air Pollution Control Assoc., Pitt-*

sburgh, Pa., 16p., 1974. 3 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-80.)

The nature of fugitive dust regulations in the various states, many of which are based at least to some degree on the Federal example regulation in Appendix B of 40CFR Part 51, is discussed. The Federal example calls for reasonable precautions to be taken to control fugitive dust and cities suitable control procedures for various sources. Many states have adopted these regulations in whole or in part. Many have made the regulation more definitive by requiring that emissions beyond the property line of the source be invisible or meet a specific opacity limitation, particle size, or number limitation, or not exceed the ambient air quality standard for particulate matter. The attempt to make the regulation more definite often has created more problems than it has solved. Inasmuch as fugitive dust problems are highly lcoalized, it is likely that across-the-board regulations may not be suitable. Specific regulations should be written for those sources of greatest importance in a given state. If across-the- board regulations are desired, the Federal example regulation without added numerical limitations is the best approach.

45312 **APTIC NO. 65598**

Haager, Karlheinz

GUARANTEED POWER SUPPLY AND ENVIRONMENTAL PROTECTION - A CONFLICT OF INTERESTS? *(Sicherheit in der Elektrizitaetsversorgung und Umweltschutz - ein Zielkonflikt) Text in German. Elektrizitaetswirtschaft, 73(11):283-286, 1974.*

A safe and guaranteed power supply for the Federal Republic of Germany in the future is in danger because that draft of the revised technical directives for the maintenance of clean air not only makes the erection of new power plants extremely difficult but will also take many power plants out of operation. The revised directives will cut the present maximum allowable emission concentrations in half without granting an adjustment period to existing emitters. As a consequence, 20% of the existing power plants with a capacity of at least 7400 MW for the hard coal-fired plants and 1600 MW for soft coal-fired plants will have to stop operation. The draft is furthermore based on the assumption that flue gas desulfurization is state-of-the-art for power plants of the size of 4TJ/h. An installation of desulfurization equipment would therefore be mandatory for these power plants. Examples in the U. S. have shown that such a move would reduce the capacity of power plants. A fruitful discussion between federal government and industry will be necessary to solve this obvious conflict of interest.

45313 **APTIC NO. 65270**

Hagevik, George H.

EMISSION ALLOCATION AND EMISSION DENSITY ZONING: TECHNIQUES FOR ESTABLISHING THE BASELINE FOR LAND USE AND TRANSPORTATION PLANNINNG DECISIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1974. 2 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-148.)*

Emission allocation and emission density zoning are discussed as techniques for establishing the baseline for land use and transportation planning decisions. Emission density can be applied to industrial areas to limit the location of air pollutant sources within defined districts, but implementation problems can be considerable. Emission allocation planning is a more generalized technique that has greater value as a maintenance strategy on the regional scale. The California Air Resources Board hopes to implement emission allocation in five air basins. Maximum allowable emissions would be determined based on the regional holding capacity which would be defined based on air quality standards. Land use based emission factors would be utilized to relate urban growth to air quality. There is a direct relationship between emissions and ambient air quality levels. The major problem is the implementation of the procedures, a rather sophisticated process requiring multiple levels of government and a close interaction between air pollution control officers and land use planners. Emission allocation planning makes indirect source regulations less of an ad hoc incremental measure so common in air pollution control, and more a part of comprehensive strategy to maintain the quality of air. (Author abstract modified)

45314 **APTIC NO. 65548**

Heberlein, Thomas A. and Frank Kreith

AN ANALYSIS OF THE NEPTA REVIEW PROCESS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 32p., 1974. 16 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-208.)*

The effectiveness of the National Environmental Policy Act (NEPA) review process was evaluated as evidenced by changes between the draft and final impact statement on several types of projects. The NEPA review process was instrumental in producing major changes to reduce environmental impact on the basis of in depth case studies which analyzed the initial statements, the responses of the public and other agencies, and the final statements according to which the actions were finally undertaken. Shortcomings in the review process itself include: lack of multidisciplinary inputs, time of the review process which comes too late in project development, failure to provide high levels of flexibility, and no consideration of alternatives. (Author abstract modified)

45315 **APTIC NO. 65500**

Herwig, Lloyd O.

GROWING FEDERAL SUPPORT FOR SOLAR ENERGY APPLICATIONS. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th., Symp. Sol. Energy Util., Washington, D. C., 1974. p. 93-103. (April 30.)*

The Federal government is studying terrestrial applications of solar energy, and the National Science Foundation is coordinating the activities of Federal departments and agencies in broad scale efforts to improve the economic viability of systems in six solar technology areas: heating and cooling of buildings; solar thermal energy conversion; photovoltaic conversion; biomass production and conversion; wind energy conversion; and ocean thermal energy conversion. Federal funding has increased over the years and for fiscal years 1971, 1972, 1973, 1974, and 1975 the solar energy budget is 1.20, 1.66, 3.96, 13.2, and 50 millions of dollars, respectively. Growing numbers of scientists and engineers are intensively studying the further role of the sun for providing energy and power to augment U. S. resources without causing environmental pollution. A 5-year plan has been developed leading to operation or initiation of construction of a system of proof-of-concept experiments in each of the six solar technology areas. These experiments can prove that the full technology base is developed and that economic viability can be projected. The solar technologies closest to practical systems are those for buildings and agricultural use, wind energy conversion, and bioconversion of organic matter to methane gas. Proof-of-concept experiments can be completed within the next 5 years for specific systems. (Author abstract modified)

45316 **APTIC NO. 65585**

Horie, Yuji

EVALUATION OF EPISODE CONTROL SCHEMES THROUGH AIR QUALITY DATA ANALYSIS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1974. 8 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-269.)*

Prediction performance of various air pollution episode models is compared with that of a persistence model which is based on the assumption that present concentrations persist to a future time. The comparisons are made by computing a correlation coefficient for different lead times between the observed and predicted values, and an auto-correlation function of the air quality data to which the episode model is applied. The persistence of high levels of air pollution is next examined, using existing air quality data, by constructing frequency distributions of air pollution episode duration for various concentration thresholds. Based on the results of persistence analysis, the flaws of currently used episode management schemes are discussed and some alternative episode management schemes are presented. Methodologies and parameters to evaluate the anticipated performances of episode management schemes are developed and some examples are worked out. A combination of episode persistence analysis and air pollution meteorological forecasting could lead to a workable air pollution episode management scheme. (Author abstract modified)

45317 **APTIC NO. 65527**

Kennedy, Allen S., Edward J. Croke, Richard L. Reisenweber, and Thomas E. Baldwin

AN ECONOMIC COMPARISON OF POINT-SOURCE CONTROLS AND EMISSION-DENSITY ZONING FOR AIR QUALITY MANAGEMENT. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1974. 5 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-172.)*

A methodology was developed for the economic comparison of point source controls and emission density zoning for air quality management. A geocoded data base combining air pollution, economic activity, land use, employment, and energy consumption was compiled for a large urban area. Statistical analyses of the data were used to quantify the relationships between these parameters and air pollution emissions. The resultant land use-oriented emission estimated was then coupled with atmospheric dispersion models to generate an assessment of the air quality impacts of land use planning and development decisions. The methodology can be used to evaluate alternative regional air pollution strategies, including land use controls. Figures of merit were applied to analyze and compare both proposed point source control regulations and emission density limitations. The figures of merit include the feasibility, cost, and effectiveness in achieving and maintaining air quality standards and the added environmental impacts due to the application of control equipment. (Author abstract modified)

45318 **APTIC NO. 68071**

Kubota, Torahide and Tsunehiro Yajima

REGULATIONS OF ORGANIC COMPOUNDS TO COPE WITH AIR POLLUTION, PART I. THE REGULATION AND ITS NECESSITY. *(Taiki osen taisaku to shiteno yuki kagobutsu no kisei - dai ikkai: kisei to sono hitsuyosei). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(9):74-77, Sept. 1974.*

It is estimated that the annual amount of hydrocarbons released from automobiles into the air of Tokyo reaches 150 thousand tons and from paint and ink-manufacturing factories of 70 thousand tons. The sources of organic compound air pollution consist of automobiles (67%) and of paint, ink, and detergent industries (33%). A policy of reducing the present concentration of hydrocarbons released from automobiles to 1/10 of current levels by regulations to be enforced in 1975 was legislated. In case oxidants continue to occur, the value of hydrocarbons released from mobile sources will be considered again. Regulations of organic compounds in the air are being enforced in the U.S.S.R. at the level of instantaneous maximum value and 24-hour mean value. Dimethylformamide and chloroprene are not regulated in Japan but were regulated 10 yr ago.

45319 **APTIC NO. 65695**

Meyers, Sheldon

ENVIRONMENTAL IMPACT STATEMENTS AND OTHER ACTIONS IMPACTING THE ENVIRONMENT. AVAILABILITY OF COMMENTS. *Federal Register, 39(145):27343-27347, July 26, 1974.*

The review of Environmental Impact Statements and Federal agency actions impacting the environment from June 1 to June 30, 1974 by the Environmental Protection Agency is announced. The written comments are contained in five appendices. Appendix I contains a listing of draft environmental impact statements. Appendix II contains the definitions of the classifications of EPA s comments on the draft environmental impact statements. Appendix III contains a listing of final environmental impact statements. Appendix IV contains a listing of proposed Federal agency regulations, legislation proposed by Federal agencies, and any other proposed actions pursuant to section 309(a) of the Clean Air Act, as amended. In all cases the listing includes the Federal agency responsible for the statement, the number and title of the statement, a summary of the nature of EPA s comments, and the EPA source for copies of the comments. Appendix V contains a listing of the names and addresses of the sources for copies of EPA comments listed in Appendices I, III, and IV.

45320 **APTIC NO. 68084**

Newill, Vaun A.

REGULATORY DECISION MAKING: THE SCIENTIST S ROLE. *J. Wash. Acad. Sci., 64(2):31-47, June 1974. 6 refs.*

The role of the scientist in the establishment of regulatory controls concerning environmental problems, including air pollution, is discussed. The regulatory control process is schematized into four steps: environmental problem identification and assessment, alternate control strategies, implementation and enforcement, and assessment of the action program. These steps in the control process are used to examine issues in health research and use of data for decision-making concerning: public sector versus private sector responsibility for research support; the need for an integrated program using the disciplines of epidemiology, clinical research, and toxicology; pollutant exposure and human response, emphasizing the spectrum of response, the exposure response matrix, estimates of exposure, and evaluation of the exposure response relationship; health protection versus control costs; ambient air standards versus emission standards; threshold dose; dose-response; extrapolation from animal toxicity studies; combined pollutant effects; least case-worst case range estimates; and least cost protective standards. (Author summary modified)

45321 **APTIC NO. 65687**

Quarles, John

MISSISSIPPI; APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 39(163):30127, Aug. 21, 1974.*

The approval of compliance schedules for Mississippi to comply with the requirement of 40 CFR Part 51 is announced. Limited changes were made as a result of written comments and the schedules are approved as corrected. The schedules give the dates by which various sources must comply with emission standards to meet the state implementation plan.

45322 **APTIC NO. 65688**

Quarles, John

NEW YORK; SULFUR OXIDES CONTROL STRATEGY REVISION. *Federal Register, 39(162):30038, Aug. 20, 1974.*

The approval and promulgation of implementation plans for New York on the revision of the sulfur oxides control strategy are announced. The plan provides for the adequate control of sulfur oxides emissions in the Hudson Valley, Genesee-Finger

Lakes, Southern Tier West and Central New York Intrastate Regions. The revised limitations as well as the revised secondary standard for sulfur oxides are adequate for the attainment and maintenance of the national ambient air quality standard for SO2 in all parts of those regions. A detailed analysis was performed which provides the revised emission data and the expected impact of the amendments. Another revision New York State will allow the use of supplementary control systems as an alternative to the permanent use of low sulfur fuels. Certain new requirements are imposed on those sources in the Niagara Frontier Air Quality Control Region.

45323 **APTIC NO. 65693**

Quarles, John

APPROVAL AND DISAPPROVAL OF PLAN REVISIONS FOR ILLINOIS, INDIANA, MICHIGAN, AND WISCONSIN. *Federal Register, 39(151):28155-28160, Aug. 5, 1974.*

The approval and disapproval of revisions for the State Implementation Plans for Illinois, Indiana, Michigan, and Wisconsin are announced. Each approved revision establishes a new date by which the individual source must comply with the applicable emission limitation in the Federally approved State implementation plan. Interim dates are provided in the schedules. Disapproval of several schedules is promulgated because of failure to comply with substantive requirements relating to compliance schedules in 40 CFT 51.15. The regulations do not affect the ability of States to develop new schedules or to correct deficiencies in schedules which are disapproved. Written comments were considered in the evaluation of the schedules. An Illinois regulation is approved respecting a solid fuel limitation necessary for the attainment and maintenance of particulate matter and sulfur dioxide standards in the Chicago Major Metropolitan Area.

45324 **APTIC NO. 65525**

Rider, Theodore H.

CONSORTIA ACTIVITIES IN SUPPORT OF AGENCIES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1974. 18 refs. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-167.)*

University consortia activities in support of federal, state, regional, and local air pollution and environmental agencies are summarized. The kinds of activities that have been undertaken include: supporting internships, providing technical assistance, gathering information, and providing continuing education opportunities. Specialists from Consortia universities are used by agencies for specialized needs such as developing long range plans or providing expert testimony on a technical topic in a hearing. Over 40 graduate students are assigned to agencies to help the agency carry out special intensitive short range studies. Because the majority of employees in state pollution agencies have had no formal training pertaining to the environment, Consortia have sponsored and staffed continuing education courses for agency personnel. The Consortia have sponsored information gathering activities including supporting special publications and sponsoring more than 30 regional environmental conferences designed primarily to aid control officials.

45325 **APTIC NO. 65513**

Robinson, Nicholas A.

SCIENCE AND LAW: METAMORPHOSIS TO ENVIRONMENTAL CONTROL. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th, Cost. Eff. Environ. Sci., Washington, D. C., 1974, p. 521-525. 26 refs. (April 28-May 1.)*

Attorneys have had little exposure to environmental scientists, problems, and laws. Because of the increasing importance of environmental laws, attorneys must be exposed to environmental issues. Several law schools are now conducting environmental law training programs in which law students work in the field with scientists. These steps are pioneering efforts, since there is still no pattern or experience of attorneys in private practice working closely on environmental problems with colleagues in other professions. Thus, interprofessional cooperation must be increased. Most standard casebooks of law school textbooks on environmental law do not focus on the need for interprofessional cooperation. Several seminars and meetings have been conducted on new laws and environmental problems. But the casebooks and seminars provide no basis for understanding the interrelationship of law and science with respect to environmental protection. The separation between the two fields leads to poor laws and poor law practice. Action can be taken to change this by increased education, cooperation between professions, and increased interprofessional cooperation by professional societies.

45326 **APTIC NO. 65509**

Rowe, Donald R.

ATMOSPHERIC POLLUTION TRAINING FOR SCIENCE TEACHERS IN LOUISVILLE. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th, Cost. Eff. Environ. Sci., Washington, D. C., 1974, p. 479-482. (April 28-May 1.)*

In the fall of 1973, the Kentucky Lung Association and the Western Kentucky University offered an innovative course in atmospheric pollution for science teachers in Louisville. The course was designed for junior and senior high school science and health- oriented teachers. It was held at the Louisville Air Pollution Control District Office for Jefferson County. Academic credit for the course was 3 hr, made up of 2 hr of lecture and 2 hr of laboratory per week for one semester. Course credit was given at eigher the undergraduate or graduate level, depending upon the status of the student. The training program is described and outlined in an appendix. It was an important step toward the dissemination of information on air pollution to students and to the general public. The program was designed to promote maximum interaction between the instructor and the students and among the students themselves. The participants in the course, the program advisors, and the advantages and disadvantages of the course are reviewed. The success of the program suggested that similar programs in water, waste water, radiological health, industrial hygiene, and solid waste disposal should be initiated.

45327 **APTIC NO. 68061**

Shintani, Kozo

A BRIEF SURVEY OF THY COUNTERMEASURES AGAINST PHOTOCHEMICAL ATMOSPHERIC POLLUTION. *(Kokagaku taiki osen taisaku no gaiyo). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 10(5):52-58, May 1974.*

On July 18, 1970 a number of girl students fell sick on the campus of a girl s high school in Suginami-ku, Tokyo. The investigations showed that the oxidant concentration at that time was as high as 0.29 ppm. Since that time the problem of atmospheric pollution has been taken up as a social problem. The most important method for decreasing photochemical pollution is to decrease the concentration of nitrogen oxides which are discharged from high temperature combustion apparatuses such as boilers, furnaces, automobile engines, and cooking facilities in homes. Legal countermeasures were established immediately and standards were set up. Alarms are issued when the pollution exceeds a critical value and factories are ordered to lower their discharge of pollutants. Between April and October, pollution alarms were issued more than 20 times in the prefectures of Ibara-ki, Chiba, Kanagawa, Osaka, Hyogo, and Ehime. In Tokyo and Saitama, the alarms were issued as many as 45 times. A government plan was established for pollution prevention in 1974. The plan consists of investigation of photochemical pollution, prevention of photochemical pollution, forecasting and monitoring, social health measures, and international cooperation.

45328 **APTIC NO. 65586**

Sklarew, Ralph C. and Leland S. Webster

USING DATA FROM AN AIR QUALITY MONITORING SYSTEM. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1974. (Presented at the Air Pollution Control Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-270.)*

Applications of the mini-computer in a data acquisition system to data presentation and analysis are presented. A multitude of analyses are introduced, which can be classified into: graphical display (isopleth maps for hourly or longer-term averages or maxima, individual station-concentration graphs showing temporal variations, and trajectory plots); delineation of air quality and meteorological regimes (data base development and use in impact studies and emissions controls); causal analysis (trajectory analysis and concentration ratios for smog aging); trend analysis; and dispersion modeling. Each could form the basis of an extensive study; however, simplified versions of techniques already in use can easily be adapted to the present data acquisition system resulting in maximal results with minimal investment in time and money. The implementation of these techniques is practical and should be undertaken for most monitoring networks. The rational control of air quality depends on the availability and proper use of ambient air quality data. These techniques provide the data in the most useable forms and require only the under-utilized mini-computer in most air monitoring networks. (Author conclusions modified)

45329 **APTIC NO. 65684**

Snyder, Daniel, III

PENNSYLVANIA. AIR QUALITY COMPLIANCE SCHEDULES. *Federal Register, 39(149):27809-27810, Aug. 1, 1974.*

Proposed revisions to Air Quality Compliance Schedules of Pennsylvania are announced. Each proposed revision establishes a date by which an individual air pollution source must attain compliance with an emission limitation of the State Implementation Plan. The schedules include incremental steps toward compliance with interim dates for achieving those steps. Each compliance schedule was adopted by the Pennsylvania Bureau of Air Quality and Noise Control and submitted to the Environmental Protection Agency after notice and public hearing in accordance with the procedural requirements of 40 CFR Part 51. Public comments are invited.

45330 **APTIC NO. 65689**

Svore, Jerome H.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. NEBRASKA; APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 39(162): 30049-30050, Aug. 20, 1974.*

The approval of compliance schedules for Nebraska for implementation of the national ambient air quality standards is announced. Each approved revision establishes a new date by which the individual source must comply with the applicable emission limitation in the Federally approved State Implementation plan. The schedules include incremental steps toward compliance with the applicable emission limitations. An evaluation report was prepared for each individual compliance schedule. Copies of the reports and the proposed schedules are available.

45331 **APTIC NO. 65690**

Svore, Jerome H.

KANSAS. APPROVAL AND DISAPPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 39(159):29380-29383, Aug. 15, 1974.*

The approval and disapproval of compliance schedules for Kansas is announced. Each approved revision established a new date by which the individual source must comply with the applicable emission limitation in the Federally approved State Implementation Plan. One schedule is disapproved because of failure to comply with the substantative requirements relating to public hearings in CFR 51.4. If the state-submitted schedule is ultimately disapproved, the air pollution source involved would continue to remain subject to the immediately effective compliance dates set by applicable State regulations in the Federally approved State Implementation Plan. An evaluation report was prepared for each individual compliance and copies of the evaluations and the schedules are available for public comment.

45332 **APTIC NO. 65691**

Svore, Jerome H.

KANSAS AIR QUALITY STANDARDS. APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 39(161):29940-29941, Aug. 19, 1974.*

The approval of compliance schedules for the Kansas air quality implementation plan is proposed. The schedules were reviewed and determined to be consistent with the approved control strategies of Kansas. Each approved revision establishes a new date by which the individual source must comply with the applicable emission limitation in the Federally approved State Implementation Plan. An evaluation report was prepared for each individual compliance schedule. Copies of the evaluations and the schedules are available for public comment.

45333 **APTIC NO. 64972**

Tohata, Heiichiro

THE FUTURE PROJECTS FOR AIR POLLUTION CONTROL -- ADVICE FROM THE ACADEMIA. *(Taiki osen boshi kore kara no kadai-gakkai kara no teigen). Text in Japanese. Kagaku Kojo (Chem. Factory), 18(8):57-58, Aug. 1974.*

Air pollution by hydrocarbons will be the most serious problem in the future. Presently there is no effective regulation to control them. Every kiloliter of heavy oil consumed by a boiler in a power plant is releasing 6 g of hydrocarbons (calculated as methane) into air. The Tokyo metropolitan government has regulations on storage tank for more than 50,000 l of gasoline, but most gas stations in the area are smaller in capacity. There are more than 7000 business facilities where organic solvents are constantly evaporated. It is advisable that environmental standards be established that emission standards can be expected to follow. Nitrogen oxides is the most distributed pollutant and the most damaging one at this moment. Emission standards for NOx from fixed sources is still in a transition state, awaiting more extensive development in the prevention techniques. There are five substances listed as offensive odors under the national odor control law. The shortcoming of the law is that these odors are listed as individual substances while in many cases odors are from compound substances. Development of low cost apparatus for odor prevention is probably the most urgent matter.

45334 **APTIC NO. 65266**

Walker, Wayland J.

MINIMUM PLANNING CONSIDERATIONS FOR COMPLEX SOURCE REGULATION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 31p., 1974. 11 refs. (Presented at the Air Pollution Controll Association Annual Meeting, 67th, Denver, Colo., June 9-13, 1974, Paper 74-143.)*

The minimum planning considerations for complex source regulation were developed. Complex or indirect sources are defined along with a description of the Denver pollutant sources and meteorological conditions, some of which are common to many communities of comparable size and life style. Some legal questions are raised with regard to state vs. local autonomy, and some important socioeconomic factors are discussed which must be recognized in the air quality control planning process. Necessary urban renewal programs require parking structures which may appear to exceed federal or state standards. A proposed parking structure may contribute more to the solution of the problem by offering an alternative to the automobile. Air pollution control remedies are subject to the balancing considerations propounded by other interest groups of the urban community. (Author abstract modified)

45335 **APTIC NO. 65504**

Wohlers, Henry C. and Frank L. Cross, Jr.

ENVIRONMENTAL IMPACT STATEMENTS AS A REALISTIC METHODOLOGY FOR COST EFFECTIVENESS EVALUATIONS. *Inst. of Environmental Sciences, Proc. Inst. Environ. Sci., Annu. Meet., 20th, Cost. Eff. Environ. Sci., Washington, D. C., 1974, p. 295-301. 18 refs. (April 28-May 1.)*

A method of evaluating the environmental aspects of a project, including air pollution control, is presented. The procedure, knonwn as the Environmental Impact Statement (EIS), is used extensively by the Federal government of the U. S. and by many state governments. The major advantage is that the EIS assesses the total impact of a project on the enivronment. The EIS determines the state of the environment in the project area, the effect of the project (construction, operation, and maintenance) on the environment (on a short-term and long-term basis), and decides if the project is worthwhile. The legal aspects of the EIS are reviewed including their preparation, advantages, and disadvantages. (Author summary modified)

45336 **APTIC NO. 65416**

Little, Arthur D., Inc., Cambridge, Mass.

IMPACT OF MOTOR GASOLINE LEAD ADDITIVE REGULATIONS ON PETROLEUM REFINERIES AND ENERGY RESOURCES -1974-1980, PHASE I FINAL REPORT. *Office of Air and Water Programs Contract 68-02-1332, Task 4, Rept. EPA-450/3-74-032-a, 85p., May 1974.*

NTIS: PB-234 185/AS

Results of a study to assess the impact on regulations of petroleum refineries and on energy resources of two regulations promulgated by the Environmental Protection Agency to control the level of lead additive in motor gasoline are presented. The first of these regulations requires the availability of low-octane, lead-free gasoline for vehicles which will be equipped with lead sensitive catalytic converters designed to meet 1975 automotive emission standards. For health reasons, the second regulation requires a gradual phase-down of the lead content of the total gasoline pool (including higher octane gasoline to satisfy the remaining high- compression ratio engines). The study considers separately the impact of each regulation. Effects on overall refinery yields, on refinery operation flexibility to maximize production of gasoline and/or heating oils, and on energy resources requirements have been considered. Other parametric studies evaluate suppositions of a need for a higher octane lead-free gasoline and a higher demand for lead-free gasoline than now forecast. (Author abstract)

45337 **APTIC NO. 65609**

THE FEDERAL ENVIRONMENTAL PROTECTION AGENCY. *(Das Umweltbundesamt). Text in German. Chem. Ind. (Duesseldorf), 26(4):233-235, April 1974.*

The establishment of a Federal environmental protection agency in the Federal Republic of Germany has its origin in the environmental protection program of the Federal government. It will lead to a productive co-operation among existing federal institutions active in the field of environmental protection. The agency shall provide scientific aid to the minister of the interior in all matters of emission protection and solid waste disposal, particularly in the drafting of legal and administrative regulations. It shall establish and operate the information system for environmental planning (UMPLIS) as well as an additional environmental documentation system. It shall bear the administrative tasks of the Federal government in the field of environmental protection. The agency will comprise three departments: the first department will deal with general problems of environmental pollution, with information and documentation in the field; the second department will deal with conservation of clean air, noise abatement, and the establishment of standards for air pollution and noise; and the third department will deal with waste recycling and re-use.

45338 **APTIC NO. 65624**

Kanagawa Prefectural Pollution Control Bureau (Japan)

PARTIAL REVISION OF AIR POLLUTION EMERGENCY MEASURES ENFORCEMENT GUIDELINES. *(Taiki osen kinkyuji no sochi yoko no ichibu kaisei ni tsuite). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 16:118-127, Feb. 1974.*

With regard to air pollution emergency measures and their enforcement procedures, the purposes, measuring locations, continuous monitoring, pollution conditions, warnings, emergency alerts, standards for emergency alerts, countermeasures, responsibilities of emission sources, requests for control agencies, emergency districts, communication methods, public announcements, and communications with neighboring Prefectures are discussed. The ultraemergency alert for sulfur oxide is issued when, in spite of the countermeasures in the preceding alert, the air concentration of SOx remains over 0.5 ppm for 3 or more hours, or the concentration remains 0.7 ppm or over for 2 hours. For oxidant, the ultraemergency alerts are issued when the concentration is more than 0.5 ppm/hr. Under these alerts, emitters of SOx are ordered to reduce 80% of their SOx emission. For oxidants, the main sources of emission (of smoke) are ordered to reduce 40% or equivalent of their emission material. For places of operation that do not use fuel combustion but emit nitrogen oxides, the interruption of operation is requested. As necessary, control agencies will enforce traffic controls. The general public is advised to restrain voluntarily from driving, and school children and students are advised to remain indoors. All the exercises out of door are discontinued.

45339 **APTIC NO. 65647**

Japan Environmental Agency

THE 1974 ENVIRONMENTAL WHITE PAPER -- ENVIRONMENTAL ADMINISTRATION WITH A NEW PHASE. *(Showa-49 nenban kankyo hakusho - shinkyokumen o mukaeru kankyo gyosei). Text in Japanese. 500p., May 1974.*

The topics of discussion in this compendium of the 1973 environmental administration and management programs include: the trend in the nation s environment and pollution, development of new environmental problems, the direction for environmental protection, the progress of administration policy, the present state and countermeasures for air pollution, the present state and countermeasures for water pollution, investigation and research programs, the progress of other areas of environmental management, and enforcement and general policies including establishing standards, reinforced monitoring system, public agencies for protection, public assistance, guidance, subsidies for control, and the promotion of health policy. Continuing the previous projects, the Japan Environmental Agency in 1974 will pursue general comprehensive studies in two areas: the study of photochemical smog and other large-scale urban pollution and its prevention, and the development of pollution-free automobiles. The first project cludes studies of the formation mechnism of local high concentrations from the meteorological standpoint and the development of simulation models for photochemical smogs and reaction mechanisms of trace components in automotive exhaust gases.

These studies are conducted under the sponsorship of the Ministry of International Trade and Industry. The MITI is also developing a combustion device combining two-stage combustion and gas recirculation for boilers and other fixed equipment. Another important and extensive study involves nitrogen oxide control, dentrification, catalysts and absorption.

45340 **APTIC NO. 65667**

Shimonoseki Municipal Government (Japan), Dept. of Environment

PUBLIC NUISANCES IN SHIMONOSEKI CITY, 1973. *(Shimonoseki-shi no kogai). Text in Japanese. 165p., Dec. 1974.*

Shimonoseki is a city with two industrial areas in its southern landfilled area and eastern harbor area, including emission sources such as heavy chemical industry, ship repairs, food manufacturing, non-ferrous metal, steel and iron manufacturing, and rubber manufacturing. The 1970 population was 258,425, but it is increasing. The city s air pollution countermeasures began in 1969 with a staff of six. By July 1972, pollution control and monitoring activities were much more complete, with a telemetry system and a central control room with seven monitoring stations. The total budget for environmental protection is approximately $26,000, of which more than $15,000 is for air pollution. Settling particles are measured at 12 locations, 12 times/mo. Sulfur oxides are measured by the lead dioxide method at 28 locations, 12 times/mo. Air is monitored at 5 locations in the southern industrial site and at five more locations in the eastern industrial area. Automotive exhaust gas will be monitored at six locations, and flue gas will be measured at three cooperating factories; 34 factories and 19 workshops will be inspected regularly. The 1972 air quality investigations showed a great improvement over the previous year. The level of settling particles ranged from 3.43 to 7.43 tons/sq km/mo, as compared with the 3.81 to 13.08 tons of 1961. Sulfur dioxide concentrations were 0.013 to 0.019 ppm in 1972 as against 0.025 to 0.038 ppm.

45341 **APTIC NO. 65752**

Tokyo Metropolitan Government (Japan)

A SUMMARY OF THE PROGRAM TO PROTECT TOKYO CITIZENS FROM ENVIRONMENTAL POLLUTION. *(Tomin o kogai kara boei suru keikaku- 1974-gaiyo). Text in Japanese. 145p., April 1974.*

A control program for air pollution, odors, water pollution, noise, vibration, and soil pollution covering a ten-year period starting in 1974 was developed in the Tokyo metropolitan area. There were 90,785 factories in this area in 1972. The total number of automobiles has reached 2.5 million in the same year. Approximately 82,000 tons of sulfur dioxide were discharged, 95% of them from fixed sources; 96,000 tons of nitrogen oxides were also discharged, and 68% of them were from automobiles. The approximate quantities of other pollutants emitted were: particulates, 23,000 tons; carbon monoxide, 590,000 tons; and hydrocarbons, 220,000 tons. Enforcement of air pollution regulations resulted in a significant reduction of the SO2 concentration in most of the districts in Tokyo. However, photochemical smog warnings were issued 44 times in 1973, an increase of more than 30% from the previous year. The new program includes new environmental standards aiming at the reduction of 48% of SO2, 82% of NO2, 79% of particulates, 42% of CO, and 92% of hydrocarbons. Boilers which consume more than 3000 l/day of heavy oil are required to utilize desulfurization apparatus. The program also restricts new factory construction and relocations are recommended.

45342 **APTIC NO. 68101**

CONDITIONS OF DEVELOPMENT IN COUNTERMEASURES AGAINST NITROGEN OXIDES. *(NOx taisaku no shinten jokyo). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 26(9):52, Sept. 1974.*

In Japan a policy of enforcing regulations at the same level as that of the Muskie Law was adopted on Nov. 5, 1972. It would be technically feasible to meet the standards of the Muskie Law for 1975. A public hearing was held to discuss the technical feasibility of being able to meet the nitrogen oxides standards for 1976 with nine automobile companies present. The companies demanded postponement of the regulation. Major boiler makers have discussed conditions concerning technical developments in NOx control. Nitrogen-eliminating equipment capable of treating exhaust gas amounting to 200,000 N sq m/hr is being operated.

45343 **APTIC NO. 68132**

Japan Environment Agency

POLLUTION-RELATED HEALTH DAMAGE COMPENSATION LAW. LAW NO. 111, 5 OCTOBER, 1973. *42p., July 1974.*

The context of the law providing compensation for pollution related health damage is presented. The types of compensation benefits available include: medical care benefits and medical care expenses; compensation for handicapped persons and survivors; lump compensation payment for survivors; child compensation allowance, medical care allowance; and funeral expenses. The Law provides for the establishment of a pollution related Health Damage Certification Council and a pollution related Health Damage Compensation Association. Procedures for the payment of expenses and sources of funds are outlined. There are procedures for the filing of grievances and a Grievance Board.

1973

45344 **APTIC NO. 65376**

DiBona, Charles J.

THE ADMINISTRATION S PLANT SITING AND ENERGY POLICIES. *Pub. Util. Fortn., vol. 91:21-26, June 21, 1973.*

The proposed Electric Facilities Siting Act of 1973 is discussed via a set of questions and answers. The Act was recommended in the President s message on the environment on Feb. 17, 1973. The plant siting bill is designed to cope with the increasingly complex and pressing problem of providing sites for major electric generation and transmission facilities, to meet the nation s growing power needs with due regard for environmental protection and balancing federal, state, and regional interests. The major sections of the bill deal with long-range planning, organization of certifying agencies, certification procedures, and actual certification authority. The bill requires all utilities to undertake long-range (10 years) planning for electric facilities, with notice for review and comment. Applications must be filed 3 to 5 years in advance and must be acted upon within 18 months by the appropriate state or federal agency. Only one environmental impact statement is needed. The President s energy message to Congress is also discussed via questions and answers.

45345 **APTIC NO. 65339**

Haagen-Smit, A. J.

ENVIRONMENTAL MANAGEMENT. *Beckman Instruments Process S.A., Geneva (Switzerland), Proc. Int. Symp. Environ. Meas., Geneva, Switzerland, 1973, p. 11-25. (Oct. 2-4.)*

The magnitude of the environmental problem, environmental cycles, the sulfur cycle, and the transport and diffusion of pollutants are discussed. Criteria and ambient air standards, automotive emission standards, source emission standards, and the roll back empirical method for estimating pollutant concentrations needed to meet standards are reviewed. These aspects of the environment are discussed with respect to environmental management and administration.

45346 **APTIC NO. 65377**

Jopling, David G.

PLANT SITING AT THE FLORIDA POWER AND LIGHT COMPANY. *Pub. Util. Fortn., vol. 91:27-30, June 21, 1973.*

The research and planning program for power plant siting by the Florida Power and Light Company is described. The program, now a year old, was begun in response to the company s difficulties in obtaining public acceptance of its new power plants and in response to the company s anticipation that the growth in its system load would require power plant siting at an unprecedented rate in the future. The Mantree and Martin Plants environmental impact statements are described, as well as the licensing status and permits received by the two plants.

45347 **APTIC NO. 65352**

Kruijer, G. G.

THE PETROLEUM INDUSTRY. *Beckman Instruments Process S.A., Geneva (Switzerland), Proc. Int. Symp. Environ. Meas., Geneva, Switzerland, 1973, p. 173-178. (Oct. 2-4.)*

Increased population and consumer demand has led to increased consumption of petroleum products. The increased use of petroleum has in turn led to increased pollution from stationary and nonstationary sources. The main air pollutants are sulfur dioxide, nitrogen oxides, hydrocarbons, particulate matter, and bad odors. The International Study Group CONCAWE was formed to study environmental pollution and to find control methods. The organization, research, and goals of the CONCAWE are generally reviewed.

45348 **APTIC NO. 65344**

Leutert, G.

TOPICAL IDEAS ON CLEAN AIR REGULATIONS. *Beckman Instruments Process S.A., Geneva (Switzerland), Proc. Int. Symp. Environ. Meas., Geneva, Switzerland, 1973, p. 97-105. (Oct. 2-4.)*

The status of clean air legislation in Switzerland, clean air strategies, air pollution limits, and monitoring and efficiency control methods are reviewed. It is necessary to establish judicious objectives for comprehensive and effective air pollution control and to carry out all measures in accordance with these objectives. The long-term elimination of air pollution requires a total approach in accordance with established objectives. It is therefore necessary to determine air pollution limits and air quality criteria and to apply air quality management and the best practical control means meet emission requirements.

45349 **APTIC NO. 65353**

Thacher, P.

THE UNITED NATIONS ENVIRONMENTAL PROGRAMME. *Beckman Instruments Process S.A., Geneva (Switzerland), Proc. Int. Symp. Environ. Meas., Geneva, Switzerland, 1973, p. 179-182. (Oct. 2-4.)*

The United Nations environmental program is generally reviewed. Recommendations have been made, a budget has been set up, and various tasks have been started. An intergovernmental body was set up to serve as the policy and priority-setting mechanism. Program goals and administration are reviewed.

45350 **APTIC NO. 65345**

Weber, E.

LEGAL DIRECTIVES FOR AIR POLLUTION ABATEMENT AND REFLECTIONS ON EMISSION CONTROL. *Beckman Instruments Process S.A., Geneva (Switzerland), Proc. Int. Symp. Environ. Meas., Geneva, Switzerland, 1973, p. 107-112. 2 refs. (Oct. 2-4.)*

Environmental problems, laws, and regulations are reviewed for West Germany. Although there is no uniform environmental protection law in West Germany, Federal, land, municipal, civil, and public laws, decrees, and administrative instruments complement and overlap one another. Two major projects are under way in West Germany: an emission inventory in Cologne and an air hygienic meteorological model study in the Lower Main region. These projects are reviewed.

45351 **APTIC NO. 65014**

ATMOSPHERIC POLLUTION REGULATIONS IN FRANCE. *(Pollution atmospherique la reglementation en France). 11p., 1973 (?). (Source not indicated.) Translated from French, 20p.*

Pollution control legislation and regulations in France have become increasingly prevalent and broad. The first laws concerned pollution exclusively arising from industrial effluents and subsequently involved all sources such as industry, combustion, and automobiles. The law of Aug. 2, 1961 concerned all sources of atmospheric pollution. A coordination of atmospheric pollution control was established by the decree of July 28, 1960 on behalf of the Ministry of Public Health. It was then transferred to the Minister assigned to the Prime Minister responsible for the Protection of Nature and Environment by the decree of Feb. 2, 1971 and codified by the decree of Feb. 23, 1973. The various legislation and regulations are described in some detail.

1972

45352 **APTIC NO. 65017**

Ibaraki Prefecture (Japan)

PLAN FOR PREVENTION OF ENVIRONMENTAL POLLUTION IN THE KASHIMA AREA. *(Kashima chiiki kogai boshi keikaku). Dec. 1972. Translated from Japanese, 83p.*

A control plan for the Kashima area is presented. The natural conditions, population, industries, and urban environment of the area are reviewed. The present state of environmental pollution in the area is discussed with respect to air, water, odor, soil, waste, and noise pollution. Major air pollutants in the area are soot and smoke, dust and sulfur oxides; nitrogen oxides are a minor pollutant. The plan consists of land use measures, consolidation of urban facilities connected with environmental pollution, consolidation of schools, consolidation of monitoring and measuring systems, permits, air quality standards to allow no further degradation of the environment, setting up of business control plans, financial assistance to industry, creation of buffer zones, relocation of housing, increased use of low-sulfur fuels, installation of control equipment, setting up of emergency measures, and increased research and development.

45353 **APTIC NO. 65022**

Japan Environment Agency, Public Hazard and Health Section

THE ESSENTIALS OF TENTATIVE COUNTERMEASURES AGAINST ENVIRONMENTAL POLLUTION BY CADMIUM. *(Kadomyumu ni yoru kankyo osen zantei taisaku yoryo). In: Countermeasures Against Environmental Pollution by Cadmium. p. 1-80, March 1972. Translated from Japanese by Seizaburo Aoki, Japanese Language Translation Service, Fujisawa, 127p.*

Because of the increased amounts of cadmium pollution of the air, food, and water found during studies in Japan, a series of tentative countermeasures were developed. A survey was made of the environmental condition of the area of concern, of the health of the area s inhabitants, and of the sources of contamination. An investigation of the environmental air in the Annaka area of Gunma Prefecture is described. The pollutants and meteorology investigated, the objectives of the investigation and the measurement methods are described. An investigation on the cadmium intake and accumulation in foods in the area is also discussed. The analytical methods of determining cadmium in food are described.

1971

45354 **APTIC NO. 65402**

Bouqiaux, J.

THE BELGIAN SO2 AND SMOKE MONITORING NETWORK. *(Le reseau Belge de mesure de la pollution par le SO2 et les fumees). Text in French. Ann. Gembloux, 77(2):133, 1971.*

General aspects of the sulfur dioxide and smoke monitoring network in Belgium, established by the Institute of Hygiene and Epidemiology of the Ministry of Public Health in cooperation with the Royal Institute of Meteorology, are presented. The network comprises some 180 monitoring stations spread over urban areas of Belgium. The instruments have been designed in compliance with the recommendations by OECD. Data processing is done by the computer of the Royal Institute of Meteorology.

GENERAL

1974

45355 **APTIC NO. 65658**

Bryan, Edward H.

INTEGRATION OF ENVIRONMENTAL AND ENERGY ISSUES. *Water Sewage Works, 1974:50-53, May 1974. 5 refs.*

The environmental impact on the energy crisis, and the impact of the energy crisis on environmental quality are reviewed. New approaches to pollution abatement and control will be required in the future. Changing perception of environmental quality by more individuals will provide a more favorable climate for environmental quality planning and management. Shrinking energy resources will provide strong incentives for exploitation of those energy resources which will be associated with strong, potentially damaging impacts on environmental quality, Resource recovery by recycling of materials that are energy-intensive in their production will be an important step toward conservation of both energy and material resources and will thus have a significant effect on conservation of environmental quality. Imposition of reasonable standards of quality on our air, water, and land resources will require control and abatement procedures that are themselves likely to be dependent upon adequate energy resources. The search for new energy resources, conservation of known energy resources, and environmental quality considerations of both energy- and nonenergy-related issues are likely to continue as the major societal problems in the foreseeable future. Resolution of these interrelated problems will depend largely on the degree to which environmental issues are successfully integrated into the analysis of energy systems. Research and development needs and objectives and the organization of a research program on environmental issues are discussed. (Author summary modified)

45356 **APTIC NO. 65636**

Grefen, Klaus

FINE DUSTS A DANGER FOR THE URBAN RESIDENT. *(Feinstaeube gefaehrden den Staedter). Text in German. Umwelt (Duesseldorf), 4(4):22-23, 1974.*

According to the emission inventory worked out in 1972 in the area of Cologne the dust emission in that year was 5300 tons: 54% of this quantity came from domestic heaters, 43% from industrial plants, and about 3% from traffic. A total of 104 various dust components could be analyzed. Fine dusts are particles with diameters of up to 10 micron. These fine dusts have rather differing properties depending on size, shape and origin of the dusts. The chemical composition may differ as well. Urban residents are exposed to far higher fine dust concentrations than rural dwellers. In the city the fine dust concentration may be 25 times higher than in the country. The analyzers available at present are not capable of describing the properties of fine dust satisfactorily. The measurement of the true grain size distribution of fine dusts is difficult. Fine dust can be collected by filters but all filters retain larger particles better than smaller particles. An electrostatic precipitator must have much larger dimensions for collection of particles with a diameter of five micron with the same efficiency as for particles with a diameter of 20 micron.

45357 **APTIC NO. 65734**

Yan, Hui-yu

THE PROTECTION OF CLEAN ENVIRONMENT AND CHEMISTRY. *(Dandan huan jing baohu huaxue). Text in Chinese. Hua Hsueh Tung Pao (Chem. Bull.), 23(1):4-8, 1974.*

A general discussion is given on environmental protection and the role which chemistry plays. It has been reported in the USA that air pollution causes unnecessary cancer and that the cancer victims in urban areas number twice as many as in rural areas. From 1960 s through 1970 s environmental science has been developed into a very broad but well-established branch of science which includes engineering, chemistry, physics, biology, medicine, and agriculture. Analysis of pollutants has also become one of the most extensively studied fields in analytical chemistry. The task of pollutant analysis is large and complicated. The most important air pollutants include sulfur oxides, carbon monoxide, nitrogen oxides, photochemical oxidants, and airborne particulates. Among them, SOx has the greatest effect on living animals and agricultural products. Results of studies have shown that approximately 15 kg of air are inhaled by an average adult per day, and that a small concentration of harmful pollutant in air can be very serious. It is estimated that an average SOx concentration of 0.05 ppm would cause 5% of respiratory disease in human beings. There are many methods available for the analysis of SOx in air. However, lead dioxide and conductivity methods are the most widely used methods. Physical chemistry also plays an important role in environmental protection. Adsorption of airborne particulates by activated carbon has been so developed that large quantities of vanadium and nickel are recovered from various exhaust gases.

45358 **APTIC NO. 65371**

Environmental Protection Agency, Research Triangle Parck, N. C., Information Services Div.

AIR POLLUTION TRANSLATIONS: A BIBLIOGRAPHY WITH ABSTRACTS - VOLUME 5 (FINAL REPORT). *Rept. EPA-220/2-74-001, and EPA- 450/1-74-001, 107p., Feb. 1974. 400 refs.*

NTIS: PB 233374/AS

A bibliography with abstracts is presented for 400 translations of technical air pollution literature. The entires are grouped into subject categories and arranged in numerical order using the Air Pollution Technical Information Center accession number. Subjects covered include: emission sources, control methods, measurement methods, air quality measurements, atmospheric interaction, basic science and technology, effects on human health, plants and livestock, and materials, economic effects, standards and criteria, and legal and administrative, social, and general aspects. Subject and other indices refer to the abstract by category letter and APTIC accession number.

45359 **APTIC NO. 65610**

Saitama Prefectural Government (Japan)

WHITE PAPER ON THE ENVIRONMENT (PREVENTION OF DESTRUCTION OF NATURE). *(Kankyo hakusho-kankyo hakai o mizen ni boshi suru). Text in Japanese. 319p., April 1974.*

The sulfur oxide pollution in southern Saitama in 1972 was 0.025 ppm to 0.03 ppm, an improvement over the 0.03 ppm-0.05 ppm level of the previous year. The eastern and central cities remained in the 0.019-0.031 ppm level as before. Generally, the degree of pollution by nitrogen oxides and suspended particulates is increasing, and a high frequency of photochemical smog is one characteristic of this primarily agricultural prefecture. In 1971 warnings were issued 20 times and alert 5 times. In 1972 there were 15 warnings and one alert. There were 1262 victims in 1970, 3663 in 1971, and 5823 in 1972. New measures taken in 1972 were: a photochemical smog prediction system; expansion of subject area to 29 cities and townships in south Saitama; control of factories by regulations; request for traffic regulation in an emergency; expansion and completion of two more monitoring stations; and the vertical investigation of smogs. High concentration of oxidants occurs when the sea breeze front stagnates, when the atmospheric pressure gradient is small in the entire Kanto area, when the southern breeze is weak around 9 am, when the visibility is less than 2 km, when there is sufficient amount of sunshine, and when the temperature is above 25 C between April and October. The level of nitrogen dioxide for 1971 was 0.024 to 0.047 ppm and for 1972 was from 0.038 to 0.053 ppm.

45360 **APTIC NO. 65644**

Saitama Prefectural Government (Japan), Dept. of Environment

PHOTOCHEMICAL POLLUTION FORMATION IN SAITAMA PREFECTURE AND COUNTERMEASURES. *(Saitama-ken ni okeru kokagku kogai hassei no keika to taisaku). Text in Japanese. 29p., March 1974.*

The photochemical pollution incidents, damages, and countermeasures taken in Saitama in 1973 are reviewed. The average temperature was higher than ordinary years by 1.8 C in April 1973, and the first photochemical incident, with 0.23 ppm of oxident concentration, occurred April 11, 16 days earlier than the previous year. Between April and October, photochemical smog forecasts were issued 44 times, warnings, 45 times, and alerts 4 times. The highest single measurement was 0.30 ppm in Wako, on July 13 at 3 pm. Between April 25 and August 29, 6678 persons from 24 cities and townships reported some form of physical effects from photochemical smogs. The greatest number of reports involved 3142 people on July 13 in Wako and Kawaguchi. The number of warnings increased by two to three times over that of the previous year, and the number of reports increased by a factor of 1.5-2. One characteristic of smog alerts in 1973 was the relatively late hour the peak compared to other years. While warnings were always between noon and 1 pm, all alerts were between 3 and 4 pm. Detailed study of meteorological conditions and smog is reviewed. Some plant damages, presumably caused by high oxidant concentration, were reported. Studies were made after the July 26 smog of 0.20 ppm oxidant on 15 species (63 samples) at 15 locations; 11 samples of 6 species showed chlorisis. The produce that showed some damages throughout the summer were: scallions, turnips, Chinese cabbage, string beans, taro potatoes, radishes, carrots, spinach, and cucumbers.

45361 **APTIC NO. 68088**

INTERNATIONAL REVIEW. *(Osservatorio internazionale). Text in Italian. Nuova Chim. (Rome), 50(6):21-26, June 1974.*

Recent efforts and achievements in the environmental protection area in different parts of the world are surveyed. The Wellman-Lord flue gas desulfurization process is currently used in eight plants in the U. S. and in Japan. The method is best suited for petroleum refineries and power plants, but can also be used for metallurgical plants. The recent petroleum shortage has intensified the research concerning the conversion of coal into gaseous and liquid fuels mainly for industrial use. Gradual reduction of the lead content in the two commercially available gasolines to 0.3 and 0.5%, respectively, has been proposed for introduction in the member countries of the European Economic Community by 1980. The gasoline with the lower lead content will be intended for areas with low pollution level. Increased calcium, nitrate, and sulfate contents in precipitation in the continental parts of the U. S. were measured.

1973

45362 **APTIC NO. 65025**

Garmonov, I. V.

THE INFLUENCE OF MAN S INDUSTRIAL ACTIVITY ON HYDROGEOLOGICAL AND ENGINEERING-GEOLOGICAL CONDITIONS. *(Vliyaniye proizvodstvennoy deyatel nosti cheloveka na gidrogeologicheskiye i inzenerno- geologicheskiye usloviya). In: Hydrogeology of the USSR. Hydrogeological and Engineering-Geological Behavior Patterns. Part 4. A. V. Sidorenko, N. V. Rogovskaya, N. I. Tolstikhin, V. M. Fomin, I. V. Garmonov, and A. I. Yefimov (eds.), Moscow, Nedra Publishing House, 1973, Foreward and Conclusion. Translated from Russian, 16p.*

The problem of protection of the environment from water pollution is generally considered. Several studies on industrial effects on hydrogeological and engineering-geological conditions are discussed which are presented in the book. The book includes chapters on the effects of buildings on ground water, the effect of mine water on hydrogeological conditions, the building of water reservoirs, the influence of land reclamation on ground water, causes of water pollution, and the influence the exploitation of territories with permafrost rocks has on hydrogeological and engineering-geological conditions.

45363 **APTIC NO. 68089**

Muzzi, A. and G. Tarsitani

MALODOROUS POLLUTANTS: A PROBLEM OF PUBLIC HEALTH. *(L. inquinamento da odori: un problema di sanita pubblica). Text in Italian. Nuovi Ann. d Igiene e Microbiol. (Rome), 24(2):65-86, March-April 1973. 33 refs.*

The mechanism of odor perception in humans, the toxic, physiological, and psychic effects of malodorous substances, and possible ways of controlling malodorous emissions are surveyed. While many malodorous substances are toxic, when present in concentrations above the odor threshold they may cause nuisance, nausea, anorexia, and sleeplessness. Malodorous emissions are generated in the pulp and paper, petroleum refinery, fertilizer, detergent, resin, fiber and rubber production, metallurgical, pharmaceutical, paint, and food industries and by automobiles. Acetaldehyde, acetic and butyric acids, acrolein, dimethyl, trimethyl and monomethyl amines, chlorine, dimethyl sulfur, ethylacrylate, ethylmercaptan, phenol, methyl mercaptan, nitrobenzene, paracresol, pyridine, and styrene are among the industrial malodorous substances with the lowest odor thresholds. The nuisances due to malodorous emissions can be avoided by diluting the malodorous substances prior to emission. In most cases, however, effective odor control by scrubbing, absorption, adsorption, filtration, thermal incineration, or oxidation with chlorine, permanganate, or ozone are required.

45364 **APTIC NO. 65043**

Pozhar, V. N.

SURVIVAL OF ENTEROVIRUSES IN ALKALINE ANTACID WATERS AT THE GAYSK ORE DRESSING COMBINE. *(Vyzhivayemost enteral nykh virusov v shchelochnykh i kislykh vodakh gayskogo gorno-obogatitel nogo kombinata). Gigiena i Sanit., 38(4):101-102, April 1973. 2 refs. Translated from Russian, 6p.*

Industrial and domestic sewage water must be purified, collected, chlorinated in special ponds containing alkaline and acid water, and then recirculated. It is important to prevent the possibility of any spread of infectious diseases by cleaning the water thoroughly. Data in the literature indicates the presence of a great many enteroviruses in sewage water, as well as the fact that existing standard methods of purification of these waters do not ensure their total inactivation. Therefore the influence of alkaline flotation and acid well water from a Gaysk Ore Dressing Combine (GOC) on the survival of enteroviruses is important, since the GOC water might kill the viruses. The effect of the GOC was studied on several viruses in a laboratory. The alkaline and acid industrial waste water from the Gaysk Ore Dressing Combine had a strong virucidal effect on enteroviruses such as Type 2 poliomyelities virus, Coxsackie B3 virus, and ECHO-7 virus. The virucidal effect was caused by the presence of a residual amount of flotation reagents and various chemicals and compounds.

1972

45365 APTIC NO. 65035

Petrovic, Velimir

DON T WALK THROUGH TERAZIJA. *(Ne shetajte Terazijama). Politika, 1972:5-6, June 26, 1972. Translated from Yugoslavian, 6p.*

Many intersections in Yugoslavian cities, such as the Terazija Tunnel area, have high air pollutant concentrations which may be hazardous to health. One intersection has air toxicity 32 times greater than the allowable level. Carbon monoxide, particulates, and other pollutants emitted by factories and especially automobiles, are the pollutants which can affect man. Belgrad has no areas of clean air. Nature is no longer able to replace the amounts of oxygen and ozone which man uses. Some of the effects of pollution are reviewed.

45366 APTIC NO. 65038

Petrovic, Velimir

EVEN THE EARTH CAN GET SICK. *(I zemlja mozhe da oboli). Politika, 1972:3-4, June 27, 1972. Translated from Yugoslavian, 5p.*

The causes and effects of pollution are reviewed. As the Earth s population increases, wooded areas will decrease in size, pesticide residues and pollution from various industries will increase, and water pollution will increase. Microorganisms in the soil and vegetation must be protected to preserve the natural ecosystem.

45367 APTIC NO. 65408

Westermark, Torbjorn and Sevald Forberg

HEAVY METALS AND THE ENVIRONMENT. *(Tungmetallerna och livsmiljon). Text in Swedish. Nor. Vet. Tidsskr., no. 5:281-294, 1972. 23 refs.*

General problems of the presence, dispersion, and effects of heavy metals in the environment are discussed. Many of the heavy metals contaminating the environment are released in combustion processes, such as vanadium and nickel from fuel oil, lead and mercury from hard coal, and lead from leaded gasoline. Arsenic, mercury, cadmium, and indium are emitted during the roasting of different metal sulfide ores. Mercury and metallic mercury become air pollutants due to evaporation, and so does tetraalkyl lead in gasoline, apart from being present in the exhaust gases. Heavy metals and their compounds are usually particulate air pollutants. Lichens are reliable indicators of settling heavy metals in urban and industrial environments. Closed technological cycles and total recovery of heavy metals is the most efficient approach to the abatement of environmental contamination by heavy metals.

45368 APTIC NO. 65158

Saitama Prefectural Government (Japan), Dept. of Environmental Protection

DATA ON PHOTOCHEMICAL AIR POLLUTION. *(Kokagaku ni yoru taiki osen kankei shiryo). Text in Japanese. 64p., Jan. 1972.*

There were 1263 cases of photochemical injuries in Saitama Prefecture from July 18 to 27 in 1970. The injuries included trembling of hands and irritation of eyes and throat. Temporary countermeasures against photochemical pollution were taken by 13 cities and two counties which were critical areas requiring monitoring. A photochemical smog alert had been issued when the oxidant concentration exceeded 0.25 ppm; present countermeasures were revised and new regulations were issued on June 24, 1971. Warnings would be issued when the oxidant hourly concentration exceeded 0.15 ppm, while emergency would be issued when it exceeded 0.5 ppm. In 1971, six apparatuses for oxidant measurement, three for total hydrocarbons, three for nitrogen oxides, and two for ultraviolet irradiation were installed at various places. In the same year, 20 warnings and 5 alerts were issued, each one lasting several hours. The total cases of photochemical injuries from May 12 to Sept. 24 of 1971 were 3663, with most of them occurring in May and June.

1971

45369 APTIC NO. 65401

Bonnier, C.

AIR POLLUTION. INTRODUCTION. *(La pollution de l air. Introduction). Text in French. Ann. Gembloux, 77(2):107-110, 1971. (Presented at the Air Pollution Symposium, Gembloux, Belgium).*

The opening speech of the Air Pollution Symposium held at the University of Gembloux, Belgium is presented. The symposium is dedicated to the study of the effects of air pollution on vegetation and human health. The importance of the multidisciplinary approach to air pollution problems by experts of the agricultural and forestry sciences, chemists, physicians, and engineers is emphasized.

1970

45370 APTIC NO. 65393

Roussel, A.

GENERAL ASPECTS OF THE AIR POLLUTION PROBLEM. *(Les aspects generaux du probleme de la pollution atmospherique). Text in French. In: Definition Homme Pollut. Air, Bruit, Eau, Paris, Editions A. Pedone, 1970, p. 31-35.*

General aspects of the problem of worldwide air pollution are discussed. Air pollution is chiefly due to industrial activity, domestic heating, and traffic. The different air pollutants, such as sulfur dioxide, carbon monoxide, nitrogen oxides, and hydrocarbons may interact with each other, facilitated by such factors as high relative humidity and ultraviolet radiation, to form new pollutants. Air pollutants affect human and animal health, plants, which are most sensitive indicators of air pollution, and various materials. Based on sensorial, physiological, or morbidity criteria, the World Health Organization has established four levels of air purity on the basis of which pollutant concentration standards can be elaborated. The war on air pollution requires global attack on an international basis, rather than isolated efforts.

1965

45371 APTIC NO. 65407

Berge, Helmut

AIR POLLUTANTS IN THE KOELN AREA. *(Luftverunreinigungen im Raume Koeln). Text in German. Allg. Forstz., 20(5):51/52):834, 836-838, Dec. 1965. 5 refs.*

An evaluation is presented of systematic air pollution monitorings conducted in the Koeln area in West Germany. The strong influence of industrial emission sources outside the city on air pollution levels measured in Koeln was noted. Except for streets with heavy, slow traffic and frequent traffic jams, other parts of the Koeln area were characterized by very low concentrations of polycyclic aromatic hydrocarbons. Phenols caused reversible acute and chronic damages to the environment, while mercaptans were detected in concentrations high enough to cause irreversible chronic and acute changes in the living environment. Sulfur dioxide, hydrofluoric acid, hydrogen sulfide, nitrogen oxides, and particulate matter in general, and soot in particular, inflicted serious damages on plants and woods. The separation of industrial and residential areas, especially by green belts, is an essential principle of modern space planning.

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